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REPORTS OF THE

DEPARTMENT OF THE INTERIOR

FOR THE FISCAL YEAR ENDED JUNE 30

1917

▽

VOLUME I

SECRETARY OF THE INTERIOR
BUREAUS, EXCEPT OFFICE OF INDIAN AFFAIRS
ELEEMOSYNARY INSTITUTIONS

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Administrative reports, in 2 volumes.

Vol. I. Secretary of the Interior.
Bureaus, except Office of Indian Affairs.
Eleemosynary institutions.

Vol. II. Indian Affairs.
Territories.

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REPORT OF THE SECRETARY OF THE INTERIOR.

18923°—INT 1917—VOL 1——1

BUREAUS OF THE INTERIOR DEPARTMENT.

The Department of the Interior was established by the act of March 3, 1849 (9 Stat. L., 395).

GENERAL LAND OFFICE.

Organized as a bureau of the Treasury Department under act of April 25, 1812 (2 Stat. L., 716).

First commissioner, Edward Tiffin, of Ohio; appointed May 7, 1812.

Became a bureau of the Interior Department when that department was organized under the act of March 3, 1849 (9 Stat. L., 395).

INDIAN OFFICE.

Organized as a bureau of the War Department under act of July 9, 1832 (4 Stat. L., 564).

First commissioner, Elbert Herring, of New York; appointed July 10, 1832.

Became a bureau of the Interior Department when that department was organized.

BUREAU OF PENSIONS.

Organized as a bureau of the War Department under act of March 2, 1833 (4 Stat. L., 622).

First commissioner, James L. Edwards, of Virginia; appointed March 3, 1833.

Became a bureau of the Interior Department when that department was organized.

PATENT OFFICE.

Organized as a bureau of the State Department under act of March 4, 1836 (5 Stat. L., 117).

First commissioner, Henry S. Ellsworth, of Connecticut; appointed July 4, 1836.

Became a bureau of the Interior Department when that department was organized.

BUREAU OF EDUCATION.

Organized under act of March 2, 1867 (14 Stat. L., 434).

Became a bureau of the Interior Department July 1, 1869, under act of July 20, 1868 (15 Stat. L., 106).

First commissioner, Henry Barnard, of Connecticut; appointed March 14, 1867.

GEOLOGICAL SURVEY.

Organized as a bureau of the Interior Department under act of March 3, 1879 (20 Stat. L., 394).

First director, Clarence King, of New York; appointed April 14, 1879.

RECLAMATION SERVICE.

Organized under act of June 17, 1902 (32 Stat. L., 388), under the Director of Geological Survey, Charles D. Walcott.

First director, F. H. Newell, of Pennsylvania; appointed March 9, 1907.

BUREAU OF MINES.

Organized as a bureau of the Interior Department under the act of May 16, 1910 (36 Stat. L., 369).

First director, Joseph A. Holmes, of North Carolina; appointed September 3, 1910.

NATIONAL PARK SERVICE.

Organized as a bureau of the Interior Department under the act of August 25, 1916 (39 Stat. L., 535).

First director, Stephen T. Mather, of Illinois; appointed May 16, 1917.

REPORT OF THE SECRETARY OF THE INTERIOR.

DEPARTMENT OF THE INTERIOR,
Washington, D. C., November 20, 1917.

SIR: This has been a year of adjustment and expansion within this department as within the Nation.

The acceptance of Germany's challenge and the realization that the national life was now at stake brought at once a new sense of the relative importance of what we did, what we had, and how we used it. Things fell away as of little value which had hitherto been accepted without questioning as worth while, and ideas, resources, powers which had hitherto been slightingly regarded rose in their stead into matters of prime national concern. Unless we could transmute gold and silver into coal and iron they could no longer be called the precious metals, and unless men had the power to convert skill, strength, and imagination into some form of shield or spear they could not play in the great game. Therefore we made new appraisal of ourselves in terms of ability to do something that would hasten the great day of peace. We judged each other by primal standards of proved capacity, not by the standards of a superficial social system. For this is the curse and the glory of war—that it has but a single scale of measurement, it puts but one simple question: "What can you do to serve me?—for now I am the nation." It is the directness and the fullness of this challenge that gives war its spell and likewise gives birth to its horrors.

"What can you do to serve me?" To that question each individual and each department of the Government must give answer. The answer of this department is that it has put every agency and activity which it has at the service of those departments more directly concerned with war making. Our men of scientific knowledge—metallurgists, chemists, engineers, topographers—have found new work at their hands. The homesteaders and the miners on the public lands have been released from their obligations if they go into the Army or show themselves to be of greater service off their lands than on them.[1] The Reclamation Service on a million and a

[1]A stalwart westerner came in early in May to say that he would like to enter the Army, but if he did he could not hold his mining claims. He was a typical prospector, of steel-frame construction, without a superfluous pound of flesh, and the long-range eye of the man who lives in the wild open—the very stuff of which the best soldier is made. But the fruit of his life's work was all to be found in a few holes in the ground and a few pieces of paper tacked on trees or posts in the mountains of the West. He was willing to take his chances of returning if the Government which wished him to go would be good enough to hold his property until his return without exacting the yearly labor which the law required. His visit was soon followed by letters from homesteaders and from other miners, making tender of their lives in the country's cause if they could be

quarter acres of irrigated lands and the Indians on a hundred reservations joined in the campaign for more meat and more wheat. The Patent Office has been searched for new devices that could be brought into use to kill the submarine or limit its destructiveness, for the plans of heretofore unused lethal weapons, and for the formulæ of improved or unknown sources of power. Before war actually came this department had compiled the data which showed the power of the Nation in mineral and chemical resources, our possible needs, and how they could be met at home or where abroad. Prepared lists of those men who had special knowledge or were of skill along the lines of our own activities enabled us to expand as the call was made.

Under the imperative mandate of war that all things shall become subject to a new classification according to their usefulness in carrying on the Nation's struggle, certain phases of our work have fallen into the background, while others have been brought into the high light of national importance. We are thinking less, for instance, of the amount of public lands that are being taken by homesteaders and are absorbed deeply in the scientific work of more recently established branches of the service. Yet if we search for the foundation

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preserved in the right to that bit of the soil they had accepted on terms which they could only meet by staying at home. I quote from one of these letters, which came from a "dry farmer" in New Mexico:

"I expect the President will need some of us and we don't want to be considered slow in coming forward. You tell him we are with him. But say to him that some other chap can grab our homestead claims if we go to the war. Now, this isn't fair. A man ought to have a place to come back to if he gets a chance to come back. So we hope you will get Congress to let things stand pat, just as they are, until we come home again. We don't ask you to give us anything, only just a chance to keep what we've got."

It required little urging upon Congress, as may be surmised, to have the law so changed that the status of these pioneers could be preserved while they were absent "on duty."

Under the act of July 17, 1917, holders of mining claims who have been, or may be, mustered into the military or naval service may, on or before December 31 of the year he is mustered into service, file in the office where the location is recorded a notice of his muster into the service and be relieved during his service and for six months thereafter of the necessity of performing labor or making improvements upon his claim to the extent of $100 per year which the mining laws require.

Under the act of July 28, 1917, any settler, applicant, or entryman under the homestead laws who after settlement, entry, or application enlists, or is actually engaged in the military or naval service, is not subject to contest for abandonment and is entitled to credit for cultivation and residence upon the land for the length of his service; and if discharged on account of wounds or disability incurred in duty, then he is entitled to credit for residence and cultivation for the term of his enlistment. Before he receives patent, however, he must live upon and cultivate his homestead for a period of at least one year. Should he die while actually engaged in the military or naval service during the war, then his widow, if she has not remarried, or in case of her death or marriage, his minor orphan children, or his or their legal representatives, are entitled to receive patent for the land.

The desert-land laws require the expenditure of $1 per acre per year in improvements on the land included in the entry for three years. Any desert-land entryman or his successor in interest who is engaged in the military or naval service may file within six months from the date of the act, or within six months after he is mustered into the service, a notice of his muster into the service in the local land office where the entry is made and be relieved during the period of his service in the war of the necessity of making this yearly expenditure, and the entry will not be subject to contest or cancellation for failure to make improvements during the period of his service and for six months thereafter. The act extends the time for making final proof by the length of the claimant's military or naval service.

of our strength, the reason that America is an invaluable ally to the western powers, it will be found in the adventuresome spirit and the exploiting energies of those who pushed their way into the wilderness and "took up" Government lands. On these the nations rely for the foods and the minerals which make possible the war's continuance. All others who work on what these produce—the manufacturer, inventor, even the soldier—are impotent without the coal operator, the oil driller, the iron master, the farmer, and the miner, on whom this "war between resources" ultimately rests. And these have been enabled to place themselves in this crisis at the world's service by reason of the generous policy of this Government in the disposal of its lands.[1] The homesteader, with his covered wagon, was indeed the pioneer in preparedness for this war, and that his work has been well done is testified to by such figures as these: This year the United States will produce roughly five hundred and fifty million tons of coal, three hundred million barrels of petroleum, seventy million tons of iron ore, and over three billion bushels of corn, an increase of over six hundred million bushels over last year.

SCIENCE AND WAR.

But the making of war to-day is far more than a test of primal resources; it tests the full powers of the Nation in every resource and capacity and especially along lines of scientific knowledge. And here again we find that the ways of peace have given something in the way of preparation for war. The scientific bureaus of the Government found themselves converted over night into adjuncts and auxiliaries in the great international contest. Men who had regarded

[1] The attitude of the homesteader toward the Government at this time can not be better presented than by a letter sent by a man in Oregon to a firm of land lawyers in this city:

"I have yours inclosing contract relative to the claim of my father for the return of $150 overpaid the Government upon the entry of public land.

"As I view the condition of this Government at this time it is no time for such items to be taken up and harassing the departments. You and your partner ought to be trying to do something to help the Government and yourselves.

"I have given personally three months of my time, and I venture it is worth as much to me as yours and your partner's is to yourselves, paid all my expenses, donated $500 to the Red Cross, purchased several hundred dollars worth of Liberty Bonds, and was one of a party that raised $33,000 in donations for the Red Cross from a population of 3,300.

"The reason I have been able to do this small amount is directly attributed to the fact that my father got title to the very 160 acres of land that you now seek to have the Government pay us back $75 and put $75 in your pocket.

"I have lived in a very small community, and there is an old saying that men do not get bigger than the community they live in. Washington is a large community and there is a number of the largest men we have in the United States reside there during their term of office, such as the President and the Senators. You have the advantage of growing and becoming very large. But I feel bigger than the whole bunch of lawyers sticking around the various departments and trying to suck something out of the ill-advised citizenry of the isolated districts.

"Trusting that you will take this in the spirit I write and that I will some time in the future hear of your firm doing something worth while."

themselves as modestly useful only in the discovering and revealing of new sources of material strength found that their years of experience in the mountains and on the desert, in laboratories and in mines, called them at once into the thick of the European struggle.

It was not long after our entrance into the war that one of our geologists came into my office, proudly dressed in an Army uniform. The last time I had seen him he had come to make report on the tungsten fields in Alaska, almost within the Arctic Circle. He had spent more than 20 summers in that distant Territory, taking here and there a sample of rock, studying the peculiar upstanding and twisted beds of coal in the Matanuska and Bering fields, rushing from one placer gold field to another, reporting on each new find of metal, until he had become identified with the rise of Alaska and was the embodiment of its hopeful spirit.

"I have come to say good-by," he said. "My next address will be somewhere in France as a member of Gen. Pershing's staff."

I naturally asked the kind of work that an Alaskan geologist would be called upon to do with an army. His answer illustrates how much of science has gone into war.

"My work," he replied, "is to be concerned with the location of trenches and dugouts. We must have trenches into which the country will not drain. These slashes in the earth can be made so that they will do their own draining. Mud, mud, mud! That is the trench curse which brings on trench feet and puts the soldier out of business."

And then on a sheet of paper he drew the slope of a hill and explained how if located in one place, because of the peculiar stratification of the earth, the trench would act as a cesspool or reservoir, gathering in all the waters of the neighboring terrain, while if placed elsewhere it would be immune from this disadvantage and through certain strata furnish a natural waste pipe for the superficial waters. So was the American soldier to be given a healthier place in which to live and work and be more efficient.

A short time later came a group of topographers, chief of whom was another of Gen. Pershing's staff. They, too, were in full khaki and bound for Europe. Theirs was to be the game of surveying, platting, and most vividly and accurately presenting to the eye the land over which the new railroads would run, the railroads that would carry men, supplies and munitions to the front, and carry back the wounded. From their maps the artillery officers could determine the heights and the hollows where the big guns would be placed, the rivers that must be crossed, their fords and banks and bridges, the roads, the ferries and forests, and all the details of a

landscape that changes from day to day under the pressing advance or the forced retreat. For now they fire guns "unsight and unseen" and men by the million move by the map.

The major who led this squad of scientific men had spent most of his life upon the rivers and in the mountains of the far West. He and his men had been for years platting the lands of the United States, showing drainage and elevations, what the farmer calls "the lay of the land;" and these modest American map makers were on their way to join a force for the remaking, possibly, of the map of Europe.

Out of the work of building our great dams upon the Rio Grande and the Colorado Rivers there also came a by-product for war making. To be sure, no large dams were needed to impound the waters of France, but the engineers who build such dams know the newly discovered art of mixing concrete as few men do. There is not so much difference, after all, between a trench and an irrigation ditch, and hundreds of miles of such smooth-surfaced, water-conserving ditches have been built upon our reclamation projects. For the construction of the dugout and the bomb proof, the gun foundation and the trench, there was need for these men of expert experience, and so to the Yakima Valley and that of the Colorado went the call of the war.

THE CHEMIST AS A WARRIOR.

Another curious illustration of the war use of peace machinery was brought to light when a group of chemists, representing the gathered genius of the country in this science met in this office to discuss the problem of toxic poisoning by gases.

When the Bureau of Mines was created by Congress five years ago, it was hardly to have been imagined that the methods used for the saving of life in the coal mines of the United States would become of vital use in the problem of saving lives and destroying lives in a world war; yet this is just what has happened. Germany, which has been foremost for some years in the science of chemistry, and out of its extensive experience has developed a form of warfare which had not before been known, a modern expression of those diabolical inventions such as the cervi and stimuli which made Cæsar's campaign in Gaul to be characterized as a war of science. To meet this new method of attack by deadly gases, the western powers promptly provided gas masks which contained chemical absorbents or other agents that would negative the effects of the gases sent adrift by their enemies. The soldier's kit, which was so simple a thing in other wars, had to be increased by a gas mask not unlike the helmet of a deep-sea diver, with a box of chemicals adapted

for offsetting the effect of the various kinds of gas the enemy was known to use; and for special use in dugouts and saps filled with concentrated gas, an oxygen supply was furnished. These outfits were not new to the world. For some years there has been keen rivalry between the great mining nations as to the one which provided the best. They were put on by those who went into the mine where poisonous gases from explosions or fires were known or supposed to exist. Every rescue gang wore them. This country claimed that it had improved upon the English, German, and French in the mask which it provided.

At any rate when we came into the war we found ourselves prepared with the knowledge, the machinery, and the men to promptly meet the need of gas masks in great quantity and of a superior type. Thus the men who had been on this work of meeting the gases compounded in nature's laboratory were found to have a reserve of knowledge as to what gases will kill and what will choke and what will burn and what will hasten disease, which in a war of cumulative frightfulness would make the United States modestly distinguished if it wished to so shine. As one of the group said, "We chemists in America have never turned our minds to the destruction of human life. Our work has been constructive—the chemistry of the soil, of cement, of printers' ink, of the by-products from petroleum and tar, of 10,000 things which will make for a longer, a happier life for man. But if the world is to be turned upside down and instead of staying death and disease, and making new things that man can use for his own ennoblement, we are wanted to push forward the work of the destruction of man and all his works, we can become rivals of the worst in such enterprise."

This is not the time to present the things done and the things doing by these men of the necromantic science, but when the day comes for casting up accounts and giving credit their work will not go unrecognized.

In this department we have during the past year had a glimpse of the expanding romance of chemical study. We have found adventure in the search for the hidden secrets of petroleum, natural gas, and coal tar, of coal smoke and the refuse from a hundred furnaces and smokestacks. We appear to have suddenly driven into a chemical age, or perhaps it would be more accurate to say that we have suddenly realized that we are in such an age. New explosives, new fertilizers, new sources of power, of food, new materials for construction and destruction, new preservatives of life and new agencies for the sweetening and wholesoming of life—these are to the credit of the modern chemist, and as a by-product of this war we are to have a higher appreciation of this branch of science, and our genius for discovery which has so greatly been applied to problems of mechanics

will find in analytic and synthetic chemistry a field of opportunity subject to almost infinite expansion.[1]

America has been a wholesaler in raw materials. Our boast has been in the millions of tons of steel or coal or barrels of oil or of feet of lumber that we could produce. We dealt in things of magnitude, that we took greatly as they came out of nature's storehouse, not thinking or not caring how much of any mysterious value they concealed. The chemist finds that nothing is simple; he tears all things apart to find things that are not patent to the eye, and out of the infinitely little and obscure creates a new world of things useful and beautiful. This is the conversion that is going on in America in all fields. We are entering upon the quest for the minor metals, our rarer woods, our select places of beauty and of exceptional climate or fertility. In all the domain of this great country extending from the semitropics across the desert and the most forbidding

[1] The growth of the chemical industries in the United States since 1914 has been phenomenal. Not only have factories sprung up to manufacture products formerly imported but great expansion has taken place to supply the increased demand for all chemical products. The country now manufactures practically everything required along chemical lines.

The increase in capital invested in chemical industries was, in 1915, $65,565,000; in 1916, $99,244,000; and up to September, 1917, $65,861,000 over the preceding year. New chemical industries are now being opened up at an unprecedented rate, owing to war needs and the energy of American chemists and physicists.

Before the war 90 per cent of the artificial colors and dyes were imported, five or six concerns with 400 operatives producing 3,300 short tons per year. Now there are over 90 enterprises, each making special colors, and 100 concerns making crudes and intermediates.

Sulphuric acid, the chemical barometer, has doubled in production. In 1916, 6,250,000 tons of 50°. Bé. were produced. The estimate for 1917 is much greater, and the production for 1918 will again greatly increase.

By-product coking doubled its capacity in the last three years, yet in 1918 the United States will make half her coke in beehive ovens. Light oil, which contains the benzene and toluene needed for explosives, jumped from 7,500,000 gallons in 1914 to 60,000,000 gallons in 1917, and is again being largely increased. Ammonia production has increased 100 per cent in three years and the visible supply is insufficient to meet demands.

Gasoline production has increased from 35,000,000 to 70,000,000 barrels per annum since 1914.

Potash importation from Germany was stopped by the war, which has stimulated production in this country. The production from January to June, 1917, was 14,023 short tons of potash. This is a small production, but sodium salts have been substituted for almost all purposes except agriculture. Shortage of labor and coal is seriously interfering with the potash-brine evaporation in Nebraska, which was yielding about 90 tons per day.

The production of explosives and consequent consumption of nitric acid has increased enormously. The nitric acid is still almost entirely made from Chili saltpeter, but synthetic nitrogen plants are under process of construction, and we have large quantities of coal-tar ammonia which can be used for munitions if necessary.

Before the war 40,000 tons of barite were imported from Germany for the manufacture of lithopone. Now five companies are producing this article from deposits in Tennessee, Kentucky, Virginia, and Missouri.

The smelting of all metals, iron, zinc, copper, antimony, tin, mercury, etc., and their alloys has increased to meet the country's needs.

Domestic supplies of manganese and pyrite have been augmented.

These are but a few instances of our chemical progress. The matter can be summarized by saying that American chemists have met the country's needs as ably and completely as did the chemists of Germany. We can go forward with every confidence of no serious shortage of the many chemical products required for domestic consumption.

wastes into the far Arctic we have come to believe that there is no land that is entirely valueless.

"KNOW THYSELF" IS SOUND AMERICANISM.

War forces a nation to an intensive study of what it can do. Thought and work—these are the answers to the problems of material insufficiency. We of America have had no little to boast of through the quick century of our march across a continent. And without doubt our ability to stand alone, depending on ourselves for the things that make a modern industrial nation, is something of which we may be proud, not so much because we have this land as because we have found out its worth and made it ours by putting it to use. But we soon realize when thrown into such a struggle as this war how far removed from entire independence we are. Coffee, rubber, and manganese from Brazil, chrome from South Africa, tea from the Orient, sugar from Cuba, sisal from Mexico, nitrates from Chile, hides and meat from the Argentine, wool from Australia, pyrites from Spain—these are of the raw materials we need and for which the ocean must be kept open, unless our dependent industries are to weaken. Yet it is hardly an overstatement to say that we could live alone with some substitution for a few of these things. For we do not know or have not developed what we have. One illustration will make this clear. We have great use for sulphuric acid and our developed sulphur mines have not furnished a full supply. Certain of our industries largely depend on the sulphur that we can roast out of pyrite ore that comes from Spain. The ships that have carried our wheat abroad have loaded back with Spanish pyrite. But ships, as we have found, are not to be created by rubbing Aladdin's lamp, so our pyrite supply fell short of the demand for the sulphuric acid that cuts the phosphate rock into fertilizer for southern cotton.

In studying a map of southern ore deposits with relation to the placing of a nitrate plant it became evident that pyrite was to be found in a stretch of the mountains running from northern Georgia to central Alabama. And just when this was found there came into the office one of the most forceful of southern manufacturers, who entered with a statement that he was looking for a place—"not under the spotlight," "I'm not a prima donna; just a man's job; something somebody else would shy at."

"Why not find the pyrite ore in your southern hills?" I asked.

"Never heard of the stuff, but if it's there and you say we need it for the war I'll get it."

That was almost literally the conversation that has led to the opening of five mines yielding 400 tons a day, which it is promised before the winter is over will be increased to a thousand tons a day; and

30,000 tons a month is more than 15 good ships could bring from Spain to our coast if kept in a continuous circle.

These straggling incidents will suggest the picture of a people struggling to equip itself for war. Other departments of this Government will doubtless reveal to you more completely the extent to which this Nation has proved itself adequate to the imperious needs of this time, and yet I feel no hesitancy in saying that out of the experiences of this department might be gathered the material that would illustrate the strength and the weakness of democracy making war. For we have the strength that comes from the vital, dynamic force released under free institutions where personal initiative has free play, and we have, too, the weakness that comes from a lack of the realization of the necessity for coordinated, purposeful effort.

A democracy making war is never an agreeable sight, for it is not in its normal line of life. And those who sneer or jeer because it does not play the game as well as might be, pay an unconscious compliment to the merits of free institutions. It takes time to accustom men to the short, hard words of command, and to the surrender of personal judgment. It is not easy, either, for a nation to turn its back upon the conception of a world where justice works out its ends by quiet processes, and in its stead come to the stern belief that the ultimate court is a battle field. So if there is wrenching and side-slipping and confusion there should be no surprise. The surprise to me has been with what comparative ease the transition has been made, and how much unconscious preparation for the new work had been already made.

Now, that our problem is to produce more than ever before, it is clearly to be seen that the physical resources of the United States are to-day almost completely at the command of the world's needs. If, indeed, for the past forty years this Nation had been planning to make war upon its neighbors, and so seize the continent for itself, what more would have been done to make our resources available for such an adventure? This is, perhaps, the hardest test to which the problem of our internal development could be put. Yet the answer must be that very little more could have been done or would have been done by a people necessarily doing so much.

Modern industrialism may be epitomized as power plus iron. We lack neither. It is the unprecedented and the not-to-be-anticipated burden of providing not alone for ourselves, but for nearly all of western Europe and part of Asia and Russia which makes the great demand. For our own needs we have coal and iron and nearly all the rich line of less common minerals in abundance. It sounds most boastful to say that the most paternal of governments, intent upon a dynastic purpose, would hardly have found ways to supply itself

more liberally with the fundamentals of the great war industries than has been effected by the quiet searching and working of this free people. And what is true as to minerals is equally true as to the products of the soil. The large liberty of life and the casting of responsibility upon the individual, allowing personal ambition to be a substitute for direct command, and curiosity to be the spur to knowledge—these have put under crop the greater part of the continent and made this the relief depot of starving nations.

Of one thing, however, we may be sure, that a nation intent upon its own self-sufficiency would not be holding under what is tantamount to Government withdrawal the two newest sources of power—substitutes for that coal which costs the labor of a million men and is the greatest of all the burdens of our railroads—water power and petroleum. It may be expected surely that Congress in its coming session will release these resources by passing those leasing bills which have so long been pending in both Houses.

A RISING SOCIAL SENSE.

But this war is not to be won by the measuring of resources, for if wars were to be so won China possibly would be our only rival. The spirit of the people is the making of the Nation, in war as in peace. The extent to which a people can cooperate marks the point of civilization they have reached. Now, the greatest outstanding fact of the past year, as clearly shown in the work of this department alone, is that under the crystallizing influence of a common danger and under the inspiring impulse of a common purpose, Americans are quick to come together. The very rush made upon Washington at the beginning of war by those who wished to help in any form of war work was evidence of the consciousness that life and its conduct were no longer matters of individual concern but preeminently of communal value. Industry itself, which has been thought to have no soul above the selfish acquisition of money, was foremost in its willingness to serve when shown how it could. And whenever men come to perceive something better and bigger than they are themselves, they are in the way of coming into the full light of a new sun, under the influence of which changes that are miraculous take place—in religion they call it regeneration, in industry socialization, the gaining of a new sense, a social as distinguished from a personal sense. It is all a matter of vision, of seeing clearly, clearly enough to convert speculation into conduct.

Men are already thinking of the greater America that they believe to be coming when the war is done. We are in this war as the trustees of social and political ideals, most of them unformed, even

embryonic, and these we hope to realize through the strength of the Nation. Our nationalism, intense, virile, and of the fighting kind, is a part of the machinery through which we are working to make all men our debtors. Our national purpose is to transmute days of dreary work into happier lives—for ourselves first and for all others in their time. This is the large view, the idealistic view, if you please, of America's mission. It is the subconscious philosophy of all our history—our wars, our public-school system, our conservation schemes, our enterprise.

This greater America is not to be the filmy product of a nation's fancy, the day dream of a monumental national ego. It is to be as substantial as hard thought and hard work can make it, a thing of good roads, ships, and railroads, well-fertilized farms and well-organized industry, regulated rivers put to use, and schools and schools and schools, and laboratories and more laboratories! War has taught England and France much, one thing perhaps above all others, how all important in this day is the man who has the new kind of *savoir faire*. If we are to meet the full rivalry of the world, we must rest chance for success upon our ability to produce men who, in character, in trained capacities, and in radioactive imagination will outmatch those whom they are to meet. This new America, as the old, will contribute to the world raw products with most generous hand. But the ultimate resource of the Nation is not that which lies within the ground but that which vibrates in man's brain. Therefore out of the struggle and torture that we shall pass through, and the reverses and triumph that we shall meet, there should evolve the conception of America as the center of the world's thought, an America that will give that leadership and direction to the scientific, literary, and social thought of the world that we pride ourselves we have recently given to its political thought. Our status in this war gives us a place of moral ascendency from which if we are great enough to be humble we can become real masters of men, conquerors of the invisible kingdom of man's mind.

Respectfully, yours,

FRANKLIN K. LANE,
Secretary.

The PRESIDENT.

ADMINISTRATIVE EFFORT.

THE GENERAL LAND OFFICE.

1. Allowed during the fiscal year original entries of public and Indian lands, an area of 16,201,794.34 acres.

2. Collected from all sources $6,149,630.54, as against $5,470,466.81 the preceding year, an increase of $679,163.73.

3. Collected and turned into the United States Treasury as the result of the work of the field service $109,656.02.

4. Restored to the public domain as the result of field investigation, 115,488.64 acres.

5. Secured as escrow deposits under contracts entered into under the act of August 25, 1914 (38 Stat., 708), with claimants for oil lands, pending the determination of title thereto, the sum of $1,519,923.21.

6. Approved and accepted surveys and resurveys for an area of 10,205,111 acres.

7. Approved and accepted resurveys for 2,917,871 acres, the record acreage of resurveys for the office.

8. Secured three coal leases in the Matanuska coal field, Alaska, aggregating 3,440 acres, calling for a minimum investment of $364,000.

9. Examined as to their validity 71,448 applications for entries under the homestead, desert-land, and other laws.

10. Issued supplemental patents, eliminating coal reservations, in 2,673 cases under the act of April 14, 1914 (38 Stat., 355), as against 1,120 the year previous.

11. Approved for patent 34,085 homestead and kindred entries.

12. Acted upon 5,179 applications for second homestead entry under the act of September 5, 1914 (38 Stat., 712), as against 4,891 the year previous.

13. Received 22,909 petitions for designation under the enlarged homestead act of March 4, 1915 (38 Stat., 1162), as against 17,041 the year previous.

14. Approved for patent 812 final reclamation homestead entries.

15. Approved for patent 1,142 entries under the Minnesota drainage act, embracing an area of 182,500 acres.

16. Patented 1,586,807 acres under railroad and wagon-road grants.

17. Classified in the field 900,000 acres of the Oregon and California grant lands revested by the act of June 9, 1916 (39 Stat., 218).

18. Collected and deposited in the Treasury in connection with power permits $8,407.33, as against $2,918.30 the year previous.

19. Eliminated 132,074 acres from Carey Act segregations and restored to entry under the homestead and other laws.

20. Patented 1,752 desert-land entries covering an area of 277,432 acres.

21. Approved for certification 1,233,926 acres of lands selected under State grants as school indemnity or under grants of quantity, as against 1,046,730 acres the year previous.

22. Adjudicated finally 1,268,962 acres of State selections, as against 1,145,167 acres in 1916 and 950,830 acres in 1915.

23. Effected a final adjustment with the State of California in the matter of excess indemnity school lands received by the State.

24. Issued 5,839 trust patents to Indians, embracing 945,874.73 acres, an increase of 439,913.01 acres over the year preceding.

25. Issued 2,014 patents in fee to Indians, embracing 246,230.16 acres, as compared with 2,298 such patents, embracing 300,391.71 acres, the year previous.

26. Excluded 437,461 acres from national forests, and the public lands subject to disposition in 353,788 acres opened to settlement and entry.

27. Established "The Land Service Bulletin," a mimeographic monthly publication, made up of current orders, instructions, and decisions of the General Land Office and Department, and decisions of the courts relating to the public lands.

28. Sold 1,399,752 acres of Indian lands in various ceded reservations for $2,445,582.50.

29. Sold 2,447 town lots, outside of the Territory of Alaska, for $113,900.

30. Sold town lots in six Alaska town sites for $385,645.

31. Established the town sites of Nenana, Wasilla, Matanuska, and Moose on the line of the Government railroad in Alaska.

THE INDIAN OFFICE.

1. Adopted policy of treating as competent to manage their own affairs Indians of one-half or less Indian blood, which policy will it is believed, place during the year a very large number of Indians upon the same plane of business equality with the white people surrounding them. It will also begin the reduction of expenditures and permit closer attention each year to the diminishing number who will need further protection.

2. Made a successful registration of all Indians under the conscription act and aroused great patriotic interest, as shown in the subscription of $4,707,850 in Liberty bonds by Indians and the voluntary enlistment of 1,000 students and ex-students in some branch of the military.

3. Established uniform examinations under the new vocational course of study and issued certificates of competency to a considerable number of graduates. Increased the enrollment of Indian children in the public schools under tuition contracts to three times that of last year, exclusive of 18,185 pupils in 2,285 school districts of the Five Civilized Tribes.

4. Continued the health campaign with special effect against tuberculosis, trachoma, and infant diseases with remarkable improvement in sanitation of Indian homes and great increase of cases treated in sanatoria. Established healthy baby contests in all Indian fairs.

5. Accomplished greatest results yet made in suppressing intemperance and breaking up bootlegging, aided much by prohibitory laws in 16 States where Indians reside or contiguous thereto and by Federal legislation controlling interstate commerce in the liquor traffic.

6. Waged an intensified farming campaign, following war with Germany, which has increased the cultivated acreage of Indian lands from 25 per cent to 50 per cent and will place from 40,000 to 50,000 additional acres under leasehold cultivation next year. Purchased approximately 5,000 additional stock above the natural increase under a new system of inspection that saved $20,000. Inaugurated a reporting system for the improvement of all dairy herds. Made grazing leases of tribal lands in many places at about double the rate per head for stock.

7. Reports largely increased numbers of students employed in agricultural and industrial lines, with results especially successful among automobile and other factory workers and unusual activity on the part of returned student associations.

8. Shows 456 allotments covering over 132,000 acres on the Fort Peck Reservation; 15,000 acres in allotments from the public domain approved to the Turtle Mountain Indians and large allotment work on other reservations. Over 8,000 acres purchased for 4,100 homeless California Indians, with other like purchases for homeless nonreservation Indians in Nevada. Closes the banner year in leasing of Indian lands for oil, gas, and mining purposes, with over 219,615 acres of unallotted lands under approved leases, outside of the Five Civilized Tribes and Osage Nation and 24,080 acres of tribal lands so approved.

9. During the year 2,203 applicants for fee patents carrying 275,553 acres, worth approximately $5,000,000, were approved. Reports are rapidly reaching us respecting Indians entitled to competency under the declaration and are being promptly investigated.

10. A new system of bookkeeping recommended by the Bureau of

efficiency is now fully installed, differing from the old practice by showing the actual cost of the various activities by expenditures of money and property rather than by cash disbursement alone.

11. At several of the large reservations extensive sales of timber have been made at advantageous prices, and at the Menominee Indian Mill, where 17,000,000 feet of lumber was manufactured under Government management, Indians earned more than $80,000 in wages during the year.

12. In addition to irrigation projects practically completed during the year that will yield some 230,000 acres for cultivation, important underground developments for stock-watering purposes have been made in the arid Southwest. Wells and springs thus provided are proving of great value to the Navajo Indians and the Papagos in southern Arizona.

13. There were sold at public auction leases covering scattering tracts of Osage oil lands aggregating 9,120 acres, which were being drained by wells on adjacent property to the depletion of their mineral value, for which was received a bonus consideration of $1,997,600 and royalties of 16⅔ per cent and 20 per cent, depending upon the size of tracts and daily production. The Osage reservation at the close of the year had wells producing 9,943,919.45 barrels, of which the Osage Tribe received as royalty 1,643,223.68 barrels, and total receipts from oil and gas leases for the year approximating $5,000,000.

14. In the Five Civilized Tribes were purchased for Indian homes more than 2,000 acres of land costing over $52,000, and erected 180 home buildings; sold nearly 500,000 acres of tribal and allotted land for over $2,000,000; disbursed $7,429,066.10 in per capita payments; removed restrictions against alienation from 155,428 acres of land; collected $4,407,909.62 in royalties for individual Indians; prevented losses to Indians through court proceedings in the sum of $1,514,314, and conserved for them through bank deposits and investments $3,424,226, exclusive of large savings to minors.

15. The bureau shows comparative facts as follows: In 1911 the Indians cultivated 388,025 acres and last year 678,529 acres; in 1911 they raised crops valued at $1,951,000, sold stock valued at $900,000, realized from native industries such as basket making, blanket weaving, etc., $847,556; and last year they raised crops valued at $5,293,719, sold $4,583,083 worth of stock, and increased the value of their native wares to $1,206,826. The Indian wage earners for private individuals in 1911 were 3,204, and last year the number thus engaged increased to 6,902, while the value of all live stock owned by the Indians has risen from $17,971,209 in 1911 to $28,824,439 last year.

THE BUREAU OF PENSIONS.

1. Paid for pensions, $160,895,054.

2. Returned to the Treasury $2,174,856.63 of the amount appropriated by Congress for the payment of pensions.

3. Returned to the Treasury $72,004.81 of the sum appropriated for maintenance and expense of the pension system, including salaries of special examiners.

4. Reduced the number of employees by 24 persons without the necessity of dismissing any employee.

5. By the act of April 27, 1916, providing for the Army and Navy Medal of Honor Roll, a special pension of $10 per month for life, payable quarter yearly, in addition to any other pension under any existing or subsequent law, was granted to every person over 65 years of age who was placed on said roll. Under this law there were entered on the pension roll 351 names. The amount paid in 1917 on account of this act was $41,582.

6. Under the first section of the act of September 8, 1916, the pensions of 157,248 widows have been increased from $12 to $20 per month. Under the second and third sections of said act 51,481 claims have been filed, of which 11,811 were admitted and 5,445 rejected. In the other claims filed under said act, calls have been made for testimony and the claims are still pending.

7. Under the act of March 4, 1917, known as the Indian War survivors' act, 6,517 claims had been filed up to June 30, 1917.

8. Up to June 30, 1917, only 11 claims had been filed based on service in the war of 1917, but they have materially increased at the time of writing this report.

9. Convictions were obtained in 30 criminal cases of the 31 tried during the year, because of violations of the pension laws.

THE PATENT OFFICE.

The total number of applications received for patent in 1916 was 70,303, and in 1917, 71,620, an increase of 1,317 over the prior year. The total number of applications awaiting action on June 30, 1916, was 16,559, and the number of applications awaiting action on June 30, 1917, was 16,058, a decrease of 501. The total number of patents granted in 1916, 46,133, and the total number in 1917, 44,179, a decrease of 1,954.

The total receipts of the office were $2,317,519.72, and the total expenditures for all purposes were $2,095,138.68, the net surplus of earnings over expenditures being $222,381.04 for the year.

THE BUREAU OF EDUCATION.

1. Collected, tabulated, and summarized returns from 20,759 schools and school systems throughout the United States.

2. Printed and circulated 422,063 copies of printed bulletins, reports, and other documents, and approximately 1,000,000 copies of printed circulars and duplicated letters.

3. Carried on extensive correspondence with school officers and others, mainly in answer to specific questions of educational policy. In all 137,805 letters were received at the bureau, an increase of more than 17,000 over the previous year.

4. Made, at the request of State and local school authorities, 16 educational surveys, including: Colorado (administration and support); Arizona (entire State system); University of Nevada; Elyria, Ohio; Falls and Walker Counties, Tex.

5. Completed and issued a comprehensive report covering the entire field of Negro education, following a three-year field study of existing colored schools.

6. Cooperated with other Government agencies in the task of enlisting schools and school officers in special war work, such as increased food production and food conservation, and led in the movement for maintaining school attendance during the war.

7. Completed investigations of rural-school supervision and rural-teacher training in secondary schools.

8. Held three national conferences on rural education, three conferences on industrial training, and two on home economics.

9. Introduced the bureau's plan of home gardening directed by the schools into 100 cities. Supervised intensive home gardening by the school in 8 cities in Virginia, North Carolina, and Tennessee.

10. Mantained 68 schools for natives in Alaska with an enrollment of 3,600.

THE GEOLOGICAL SURVEY.

1. Concentrated its geologic force on investigations of oil fields, published during the year 10 reports pointing out areas believed to be favorable for testing with the drill, began the publication of 16 similar reports, and prepared for publication 11 others.

2. Continued the field examination of the oil-shales of Colorado and Utah as a preparedness measure—these constituting the petroleum reserves of the Nation.

3. Began the intensive field study of deposits of "war minerals," such as manganese, pyrite, platinum, potash, antimony, and chromite.

4. Prepared for the War Department, with the cooperation of several State surveys, 23 summary reports on underground waters available for the use of large military camps, and at the request

of the War or Navy Departments made special investigations of local water supply.

5. Mobilized the topographic surveys to meet military needs by adopting early in March a program determined by the General Staff, thus postponing indefinitely the continuation of all topographic work in interior States, except the surveys of cantonment sites.

6. Contributed to the Engineer Officers Reserve Corps 61 topographic engineers, 7 hydrographic engineers, and 1 geologist, with other applications for commissions pending at the close of the fiscal year.

7. Furnished the Council of National Defense with manuscript statements on production, sources of supply, etc., of every mineral product of importance; and to serve the needs of committees under the council began the issue of monthly reports of petroleum production and weekly reports of coal production; and to meet similar needs also prepared for publication a new map of the United States showing the oil and gas fields and pipe lines, and State maps outlining the coal-mining districts.

8. Printed for the War Department 96 editions of maps needed for military use and for the Navy Department 906 editions of charts.

9. Published a bulletin on the use of the panoramic camera in topographic surveying, with a special chapter on the application of photogrammetry to aerial surveys.

10. Continued geologic investigations throughout the United States, examining mineral deposits of all kinds but specializing as stated above.

11. Continued topographic surveys throughout the United States until March, when military surveys only were conducted as a part of the program of national defense.

12. Continued stream gaging at 1,197 stations in the United States, including Alaska and Hawaii.

13. Classified 3,900,000 acres of public lands as to mineral character and 252,000 acres as to their value as power or public water reserves.

14. Classified 13,133,851 acres in 14 States as nonirrigable for designation, action being thus concluded upon 8,868 petitions from intending entrymen.

15. Cooperated with the General Land Office by reporting on 5,462 cases other than enlarged-homestead petitions.

16. Published 203 scientific and economic reports, aggregating 17,255 printed pages.

17. Distributed to the public 607,526 topographic maps, a notable feature being the 20 per cent increase in sales of both geologic folios and topographic maps.

18. Collected statistics of production for more than 75 mineral products from 92,000 producers and continued in increased volume the special correspondence, bringing producers and purchasers together.

19. Conducted general correspondence with the public, largely in answer to inquiries for technical information, the total number of letters received showing an increase of 7 per cent and the letters sent of 30 per cent over the previous year.

THE RECLAMATION SERVICE.

1. Developed, stored, distributed, and delivered irrigation water to over 1,000,000 acres of arid land in 13 States, or an area larger than the cultivated acreage of either Connecticut or New Hampshire at the census of 1910, and producing crops valued at nearly $35,000,000.

2. Operated irrigation works, including 40 reservoirs, with a total capacity of over 9,000,000 acre-feet; over 10,000 miles of canals, flumes, and tunnels; 81,000 structures, including dams, head gates, weirs, checks, and other irrigation devices.

3. Carried on construction work on 24 irrigation projects and added over 100,000 acres, or 3,000 farms, to the area under Government works for which irrigation water is available.

4. Built 450 miles of canals, 150 miles of drains, 600 bridges, 560 culverts, 57 miles of pipe line, 37 miles of roads, 8,880 canal structures, and excavated 9,468,000 cubic yards of earth and rock.

5. Cooperated with other departments of the Government, with other bureaus of the Interior Department, with State governments, and with numerous local organizations in the furtherance of reclamation work and in the interests of the water users.

6. Aided several State legislatures, through the expert advice of the legal division of the service, in the enactment of irrigation-district laws.

7. Cooperated with 30,000 water users on the reclamation projects, not only in the delivery of water to them for their land but in the furtherance of better living conditions, by means of helpful suggestions wherever possible.

8. Issued the Reclamation Record, a monthly publication of the service, devoted to the interests of the settlers on the projects and containing numerous articles by experts of the service and of other bureaus of the Government and by the water users, dealing with matters especially adapted to the needs of the settlers.

9. Cooperated with the various water users' associations on the projects, chambers of commerce, boards of trade, and railroad and State immigration officials in securing competent settlers, and in so

far as is proper under the law assisted in disposing of excess lands held in private ownership on the projects.

10. Organized community storage houses on several of the projects to take care of perishable crops until market and transportation facilities are favorable for distribution.

11. Conducted a campaign of publicity on the projects which resulted in an increase of 200,000 acres in food crops, a large part of which was due to war propaganda. Stimulated farm operations for a larger increase in 1917. The Service by its own efforts prepared and assisted in the harvesting of crops from approximately 5,000 acres and extended aid with tractor plows and seed in preparing 10,000 acres more.

12. Prepared numerous press bulletins and gave frequent illustrated lectures dealing with the activities of the service.

13. Subscribed for $90,950 worth of the bonds of the first Liberty Loan of 1917 and $175,800 of the second.

14. Contributed over 250 employees as commissioned officers or enlisted men to the armed forces of the United States.

THE BUREAU OF MINES.

1. Cooperated with the Council of National Defense and with other Government bureaus in work necessary for the successful conduct of the war.

2. Investigated the fixation of atmospheric nitrogen and the oxidation of ammonia to nitric acid, for the purpose of aiding the Government to obtain a supply of nitrates for use in agriculture or the manufacture of explosives.

3. Investigated sulphur and pyrite supplies to ascertain the possibility of providing, from domestic sources, the sulphuric acid needed in many lines of industry, especially the manufacture of explosives and fertilizers.

4. Investigated the noxious gases used in warfare and developed masks to protect men exposed to such gases.

5. Investigated the use of smoke screens in warfare and the methods best suited for producing such screens.

6. Investigated methods for increasing available supplies of necessary minerals and metals hitherto largely imported, such as manganese, nickel, and potash.

7. Ascertained how losses in the treatment of quicksilver ores can be lessened and the production of quicksilver increased.

8. Trained more than 4,800 miners in mine rescue and first-aid methods. On June 30, 1917, the total number of miners trained by the bureau since its organization was 46,873.

9. Sent its mining engineers and trained rescue men to the scene of 57 mine accidents throughout the United States to make investiga-

tions and to assist in recovery and first-aid work. Through the efforts of volunteer miners, company officials, and rescue crews, and State mine inspectors 103 men were rescued.

10. Aided in reducing the accident hazards in California mines.

11. Continued to investigate the prevalence, causes, and abatement of miners' consumption.

12. Investigated conditions in mines at Butte, Mont., with reference to the health of miners and the danger from mine fires.

13. Developed further improvements in oxygen breathing apparatus for use in rescue work after mine disasters.

14. Showed how the cost of using shale or rock dust to arrest or prevent disastrous explosions in coal mines can be materially reduced.

15. By tests and investigations continued the improvement of mine lamps. As a result of such investigations on permissibility, to date more than 100,000 portable electric lamps have replaced the dangerous open-flame lamps in the mines of this country.

16. Began work intended to increase the use of Illinois coal for the manufacture of illuminating gas.

17. Continued its activities for the protection of the miner from the dangers attending the use of explosives. Ten more explosives were tested and approved as permissible for use in dusty or gaseous mines. At the end of the year the permissible list included 151 explosives.

18. Made substantial advances in investigations for the elimination of noxious fumes and gases from smelter smoke. As a result of investigations made in cooperation with the bureau, one copper company is expending $1,600,000 in equipment for recovering dust and fume from the smoke of its smelter.

19. Worked out a process for leaching lead from oxidized ores with an acid solution of common salt. It is believed this process will enable many lead carbonate ores now neglected to be worked at a profit.

20. Made further progress in applying a volatilization process (chloridizing roast) to the commercial treatment of oxidized lead ores containing gold, silver, or copper.

21. Obtained encouraging results in the development of a leaching process for low-grade zinc ores.

22. With a view to developing domestic supplies of potash, ascertained the potash content of waste products, such as mill tailings, at many plants throughout the West, and continued to investigate the recovery of by-product potash at cement kilns and blast furnaces.

23. Through its investigation of the viscosity of blast-furnace slags, obtained information that should facilitate the smelting of the lean

and complex ores that will be used in increasing quantities as supplies of high-grade ores diminish.

24. From tests with experimental boilers, ascertained how steam boilers can be designed so as to utilize a larger proportion of the heat from the fire.

25. Showed how coal could be used with greater efficiency in many Government plants.

26. Developed an accurate and convenient electrical device for detecting inflammable gas in mine air.

27. As a result of its investigations of radium in cooperation with the National Radium Institute, acquired $200,000 worth of radium, which will be used for scientific and medical research.

28. Demonstrated that excellent ferro-uranium, an alloy used in special steels for making machine tools and ordnance, can be prepared from the uranium oxide obtained as a by-product in the recovery of radium.

29. Brought about a wider application of well-drilling methods that minimize waste of oil and gas.

30. Showed that enormous quantities of oil are left underground in many oil fields and indicated how a larger proportion of the oil could be recovered from the oil sands.

31. Showed how the recovery of gasoline from natural gas can be increased by the use of an absorption process.

32. Collected data showing what great quantities of gasoline have been wasted at oil wells, and determined the best types of gas traps for preventing such waste.

33. Investigated the losses of petroleum during storage in tanks or reservoirs and the losses by fires, and prepared reports on proper methods of storage and of fire protection.

34. Examined types of gasoline sold throughout the United States, determined their relative suitability as motor fuel, and developed specifications for the purchase of gasoline.

35. Conducted investigations that demonstrate the feasibility, under present conditions, of obtaining petroleum and petroleum products from the oil shales of Utah and Colorado.

ALASKAN ENGINEERING COMMISSION.

During the year the Alaska Railroad has been completed from Anchorage to Chickaloon in the Matanuska Valley. This is a distance of 75 miles. By this construction the Matanuska coal fields are made available for commercial development. The grade is down hill from the valley to tidewater, and a rate of $1 a ton on coal has been established. The Government is operating a mine in this field at Eska Creek, from which it has been taking out coal at the rate of

100 tons a day for the use of the railroad. Two leases have been made of other large tracts to private parties, who are now actively preparing to start operations early next spring. The Government is also developing a mine at Chickaloon. It was from this tract that the coal wos obtained on which the Navy made its test. The Matanuska and Susitna Valleys are being filled with homesteaders, who this year produced several hundred tons of potatoes and a large quantity of other vegetables and exported 300 tons of a new variety of turnips to Seattle. The main line of the railroad is being pushed north through the Susitna Valley, and rail is now laid to Montana Creek, a distance of 96 miles from Anchorage. Rail has also been laid a distance of 22 miles south of Anchorage to Rainbow Creek, and from here to Kern Creek, for 21 miles along Turnagain Arm, the heaviest construction on the entire line is encountered and the grading is actively under way. From Kern Creek to Seward, a distance of 71 miles, the road is being reconstructed, but is in operation. It is the expectation of the engineers that the work along Turnagain Arm will be finished in the summer of 1918. This will give a continuous rail route from Seward into the Matanuska and the Susitna Valleys for a distance of 248 miles. By the end of next season it is also expected that the road will be completed as far as Hurricane Gulch, just south of Broad Pass, an additional 75 miles. Work has also been carried on from Nenana on the Tanana River, south toward the Nenana coal fields, a distance of 50 miles. Next year will see this portion of the road completed from the coal fields to the river and well under way from here toward Fairbanks. The small line of railroad running out of Fairbanks to the northeast, known as the Tanana Valley Railroad, has been acquired by the Government. This is some 39 miles in length, and makes the Fairbanks gold-mining district directly tributary to the Government railroad. When the work in this division is completed these mines will be served with coal from the Nenana coal fields.

NATIONAL PARK SERVICE.

1. Organized National Park Service as ninth bureau of the department under recent act of Congress authorizing its establishment and appropriation for salaries of its officers.

2. Held conference in Washington where, during the first week in January, legislators, officials, scientists, educators, and other men and women of national prominence met to consider national parks' needs, and advise the officials of the new service.

3. Organized the first exhibition of national parks paintings; 28 canvasses by artists of distinction were exhibited in the National Gallery from January 2 until after inauguration.

4. Prepared and distributed 128,000 circulars of information relating to national parks and monuments; 117,000 copies of Glimpses of Our National Parks distributed free of charge.

5. Prepared and distributed 83,000 maps showing automobile routes to national parks and road systems within parks.

6. Prepared second edition of National Parks Portfolio; also a guide book of Rocky Mountain National Park and other illustrated park publications.

7. Circulated the equivalent of 348,000 feet of motion-picture film and the equivalent of 3,431 slides of scenes in national parks and monuments among universities, colleges, schools, churches, commercial organizations, outing clubs, etc.

8. Travel to national parks heavier during 1917 season than ever before. Total number of visitors, 487,368; 1916 visitors, 358,006; 1915, 335,299; 1914, 240,193.

9. Very large increase in automobile travel in national parks during past season. The licenses issued during 1917 in parks where automobile permits are required totaled 22,286, as against 15,536 in 1916, 12,609 in 1915, and 4,455 in 1914.

10. Assumed control of Mount McKinley region included in the national parks by act of Congress approved February 26, 1917.

11. Arrangements completed under authority of act of June 12, 1917, for establishment of a national park to include Grandfather Mountain, N. C.

12. Verendrye National Monument, N. Dak., established. Includes Crowhigh Butte, from which Explorer Verendrye first beheld territory beyond Missouri River.

13. Assumed jurisdiction of area of 25,265 acres added to Rocky Mountain National Park by act of Congress approved February 14, 1917.

14. Reorganized concessions in Yellowstone National Park in manner that made economical and efficient operation possible. All important concessions since reorganization are handled by Yellowstone Park Hotel Co., Yellowstone Park Camping Co., Yellowstone Park Transportation Co., and J. E. Haynes, official photographer. All concessions under strict Government regulation.

15. Substituted comfortable 10-passenger touring cars in Yellowstone for former horse-drawn stagecoaches.

16. Added Dunraven Pass and Tower Falls regions to regular circle trips in Yellowstone National Park.

17. Formally opened southern gateway to Yellowstone National Park by installation of automobile service to the Jackson Hole.

18. Constructed over 100 miles of trails and fine lanes to scenic places in Yellowstone National Park in development of plan to make

Yellowstone an important all-summer resort instead of a four or five days' excursion point, as in the past.

19. Arranged with Bureau of Fisheries to stock many lakes and streams in Yellowstone National Park not inhabited by trout.

20. Made important permanent improvements in Glacier National Park road system.

21. Constructed many miles of new trails for tourists' use in Glacier National Park.

22. Accepted gift of 160 acres of land for new administrative site on Flathead River opposite Belton, Mont., the western gateway to Glacier National Park, and began improvement of same.

23. Under a concession granted last year the Rainier National Park Co. completed and operated new hotel and camp in Paradise Valley, Mount Rainier National Park.

24. Made Glacier Basin on northwestern side of Mount Rainier accessible by reconstruction of Storbo road.

25. Widened and improved entire road system in southern part of Mount Rainier National Park.

26. Built broad new trail from rim of crater to lake shore, Crater Lake National Park.

27. New Glacier Point Hotel, Yosemite National Park, completed and operated.

28. Continued construction of new El Portal road in Yosemite National Park.

29. Assumed control of Wawona toll road system and eliminated charges for travel thereover, except regular automobile fee. Completed important improvements in entire road system of Yosemite National Park.

30. Completed new hydroelectric power plant in Yosemite National Park; total capacity, 2,000 kilowatts; total cost, $210,000. Will furnish power for lighting hotels, camps, roads, and footpaths in Yosemite Valley, National Park Service buildings, and for heating and cooking at the hotels and camps.

31. Perfected important exchange of timber under which splendid forest growths along certain sections of Big Oak Flat road in Yosemite Park will be forever safeguarded.

32. Improved camp grounds and extended water system in General Grant National Park; also installed shower baths for convenience of campers.

33. Completed purchase of large private holdings in Giant Forest, Sequoia National Park, under congressional appropriation of $50,000 and contribution of $20,000 by National Geographic Society.

34. Erected stairway leading to top of Moro Rock, Sequoia National Park, from which view of entire park and surrounding mountains may be obtained.

35. Prepared large areas in Giant Forest, Sequoia National Park for public camp grounds. Made same accessible and extended water and sanitation systems for convenience of public.

36. Began continuation of Giant Forest road to join with county road now being constructed to connect Sequoia and General Grant National Parks. Built this year to Marble Fork River, thus making available extensive camping area, in good fishing region, for next season.

37. Began development of Mukuntuweap National Monument (Zion Canyon), Utah, by granting concession to National Park Transportation & Camping Co. to establish permanent camp and transportation line from Lund, Utah. Completed construction of several miles of automobile highway in Mukuntuweap National Monument.

38. Completed, under direction of Smithsonian Institution, excavation and improvement in ruins in Navajo National Monument.

39. Completed extensive improvements in Muir Woods, Petrified Forest, Montezuma Castle, El Morro, Sieur de Monts, and other national monuments.

40. Investigated projects for creating national parks in the Indiana Sand Dunes and the upper valley of the Mississippi River. Published comprehensive report on the Sand Dunes proposition.

ABSTRACT OF REPORTS OF BUREAUS AND OTHER ADMINISTRATIVE UNITS OF THE DEPARTMENT.

OFFICE OF THE SOLICITOR.

The following table shows the number of matters received and disposed of during the fiscal year ended June 30, 1917, which were docketed or recorded. It does not, however, include a very large number of matters that are not formally docketed:

Work of office of solicitor.

	Public lands.		Pensions.		Miscellaneous.[1]	Disbarments.	Summary.
	Appeals.	On rehearing.	Appeals.	On rehearing.			
Pending July 1, 1916	825	104	127	2	166	4	1,228
Received to June 30, 1917	1,704	481	745	30	10,834	27	13,821
Total	2,529	585	872	32	11,000	31	15,049
Disposed of	2,040	472	684	31	10,893	25	14,118
Pending July 1, 1917	489	113	188	1	107	6	931

[1] Under "Miscellaneous" are grouped such matters as "Opinions," "Indian matters," "Contracts," etc., as well as many other varied matters arising in the several bureaus of the department, and which, for one reason or another, may be referred to the solicitor's office for consideration.

From the above table it will be noted that out of a total of 15,049 matters referred to this office, only 931 were pending and undetermined at the close of the fiscal year. It is also gratifying to note the substantial reduction as compared with the previous year which closed with 1,228 matters pending. While this gain is confined largely to public-land appeals and miscellaneous matters, there are no undue arrears. Motions, petitions, and miscellaneous matters are taken up for consideration promptly upon receipt, and appealed cases, involving both public lands and pensions, are now reached for action within a reasonable time after docket. All are adjudicated and disposed of as promptly as is consistent with careful consideration of the questions presented.

The court work for the year shows a considerable increase in litigation in which the Secretary is involved.

On June 30, 1916, there were pending in the courts locally situate 47 cases to which the Secretary was a party; Supreme Court of the United States, 9; court of appeals, 6; Supreme Court of the District, 32.

During the year ended June 30, 1917, 24 new suits were instituted in the Supreme Court of the District and one original action was brought in the Supreme Court of the United States. In another case in the Supreme Court the department appeared as amicus curiæ.

Of cases disposed of in the Supreme Court of the District, 25 in all, the plaintiffs were successful—and that only in part—in but 1 case, which is now pending in the court of appeals. Three interlocutory matters were also decided, all in favor of the department.

In the court of appeals 9 cases were argued and submitted. The department won 6 and lost 3, the latter being now before the Supreme Court of the United States for review.

In the Supreme Court of the United States 4 cases against the Secretary were decided. One original action was won; another, on writ of error, was dismissed by appellant; and 2 cases were lost. None of the cases in this court was handled by this office except a fifth case in which the department appeared as amicus curiæ. That case was decided squarely on the ground advanced in the department's brief.

There are now pending in the courts situate in Washington 55 cases against the Secretary. Of these, 12 are in the Supreme Court of the United States, 12 in the court of appeals, and 31 in the Supreme Court of the District. Of the cases in the Supreme Court of the United States the Secretary is appellant in 4; in the court of appeals in 1.

GENERAL LAND OFFICE.

Area of land entered and patented.—The total area of public and Indian lands originally entered and allowed during the fiscal year

ended June 30, 1917, is 16,201,794.38 acres, not including 240,158.67 acres embraced in finals not heretofore counted as original dispositions of land. This latter area is constituted as follows: Public auction, 180,844.05 acres; abandoned military reservations, 1,767.88 acres; cash and private sales, individual claimants, and small holding claims, 32,586.80 acres; preemption entries, 221.40 acres; and soldiers' additional homesteads, 24,738.54 acres. The area of 16,201,794.38 acres is a decrease of 2,841,358.54 acres as compared with the area originally entered and allowed during the fiscal year 1916.

The area patented during the fiscal year is 11,313,362.24 acres, a decrease of 848,45.75 acres, as compared with the fiscal year 1916. Of the above area, 7,544,055.27 acres were patented under the homestead laws, a decrease of 179,682.96 acres, not including as homesteads 22,464.50 acres patented as soldiers' additional entries.

Cash receipts and expenditures.—The total cash receipts from the sales of public lands, including fees and commissions and sales of Government property for the fiscal year 1917 were $3,632,192.89 (1916, $3,428,588.20), an increase of $203,604.69. The total receipts from sales of Indian lands were $2,445,582.52 (1916, $2,000,516.17). Other receipts aggregated $71,855.13. The total receipts of this bureau during the fiscal year 1917 were $6,149,630.54, as against $5,470,466.81 for the preceding fiscal year, an increase of $679,163.73.

The total expenses of district land offices for salaries and commissions of registers and receivers and incidental expenses during the fiscal year ended June 30, 1917, were $863,224.66. The aggregate expenditures and estimated liabilities of the public land service, including expenses of district land offices and surveys made from the appropriations for surveying the public lands outside of railroad land-grant limits, were $2,959,801.24, leaving a net surplus of $3,189,829.30 of receipts over expenditures. Disbursements from the following special deposit trust funds and reimbursable appropriations are not included in the above figures as receipts or expenditures: From deposits by individuals for surveying the public lands, $179,962.67; from surveying within land grants (reimbursable), $74,992.82; from opening Indian reservations (reimbursable), $14,572.13; from surveying and allotting Indian reservations (reimbursable) for surveying, $33,938.26; and from proceeds of labor, Oklahoma Cherokees, $88.62.

Field service.—The total amount of cash collected as a result of the work of the field force during the fiscal year was $109,656.02. In addition, there has been turned into the Treasury $11,491.07 as royalty for coal mined during the past year from a tract in Colorado.

As a result of investigations 115,488.64 acres have been restored to the public domain. Of this amount 103,680 acres represent fraudulent entries, canceled through proceedings on special agents' reports,

and 11,808.64 acres restored to open range by abatement of unlawful inclosures.

Judicial proceedings were had in 240 cases, as a result of which $50,773.88 was recovered and 14,408.85 acres were restored to the public domain.

Of the criminal cases tried during the year 19 resulted in conviction, under which 10 prison sentences were imposed and fines amounting to $3,135.75.

The average number of agents employed during the fiscal year was but two more than for the preceding year, yet the number of cases closed was over 2,300 more than last year.

The investigation of oil-land cases in California has been actively prosecuted during the year, in which 46 new trespass suits and suits to quiet title in the Government, for accounting, etc., were brought, involving an acreage of 7,700. The total number of oil-trespass suits in California is 71 and the acreage involved 13,107.

In Wyoming additional withdrawals of 165,421 acres of oil lands have been made, and 32,700 acres have been restored as non-oil, leaving 934,295 acres covered by existing withdrawals at the end of the fiscal year. There has been little change in the situation in the State so far as pending oil-land applications are concerned.

At the present time there are 48 oil contracts under the act of August 25, 1914 (38 Stat., 708), pending in California, embracing 4,160 acres. The production on the tracts covered by these contracts up to June 30, 1917, was 2,963,143.47 net barrels, and the escrow deposits arising under these contracts $217,352.54.

In Wyoming there are 25 oil contracts, covering an acreage of 6,330, on which the production up to the end of the present year was 5,547,788 net barrels.

Public surveys.—The surveys and resurveys for the year past covered 10,205,111 acres. Of the surveys, Montana was at the head of the list, with a total of 2,643,518 acres, while of the resurveys, Nebraska led with 1,220,029 acres.

The increasing demand for resurveys in the States of Colorado, Wyoming, and Nebraska has called for the allotment of the survey funds up to the 20 per cent limit fixed by the joint resolution of June 25, 1910, leaving no provision for resurveys in other districts.

To meet the growing demand for resurveys in cases where the title to the greater portion of the land is vested in private ownership special legislation is recommended.

Special attention has been given to the matter of systematizing and working out a uniformity of procedure and comparison of costs of surveys in the offices of surveyors general, with very satisfactory results.

Surveys in Alaska.—Surveys of land in Alaska suitable for agricultural purposes were executed during the fiscal year under the policy of expanding the rectangular net in accordance with the requirements of both present and prospective settlement in the Tanana Valley, in the valley of the Susitna, east of the river, and in the region between Knik Arm and Turnagain Arm, west of the foothills, under the Seward base and meridian.

Legislative authority is recommended for the survey at Government expense of homestead entries in Alaska under such conditions as will restrict them to bona fide settlement claims.

Coal-leasing law in Alaska.—The award of three leases in the Matanuska field, under the leasing act of October 20, 1914, is announced, covering an acreage of 3,440, with a proposed total minimum investment of $364,000 in mining operations upon the lands.

The extension of the coal-land surveys in the Territory so as to include such deposits as are not dependent upon railway transportation for exploitation must not be overlooked in the coming year.

Map compiling and drafting.—A new map of Alaska was completed and issued during the year, and a new map of Montana has been completed and is nearly ready for issuance.

Homesteads and kindred entries.—The number of cases of all kinds approved for patenting was 34,085, as against 36,178 of the previous year. Of this number, 30,829 are final homesteads, 2,179 commuted, and 336 under the forest-homestead act of June 11, 1906.

Under the second homestead law of September 5, 1914 (38 Stat., 712), there were 5,179 applications, of which 4,184 were accepted.

Under the act of March 4, 1915 (38 Stat., 1162), granting preference rights to petitioners under the enlarged-homestead act for lands theretofore undesignated, 22,909 petitions were received, as against 17,041 of the previous year.

Stock-raising homestead act.—The act of December 29, 1916 (Public, No. 290), authorizing a 640-acre stock-raising homestead on lands designated as chiefly valuable for grazing and raising forage crops, has not yet reached a point in its administration where a proper estimate can be placed upon the policy that led to its enactment. The delay in providing funds for the necessary field examination as a basis for designation until some months after the passage of the act led to the accumulation of a large number of applications and petitions for designation, resulting in some cases of hardship. The work of designation, however, now well in hand, will presently relieve the situation in this respect.

Reclamation homesteads.—During the past year farm unit plats of 36 townships in the Salt River and Yuma irrigation projects in Arizona were approved and filed and public notices issued announcing the availability of a water supply for the irrigation of the lands shown on these plats.

Farm unit plats have also been approved and filed and public notices issued opening to entry large tracts within the Grand Valley project, Colorado; Boise project, Idaho; Klamath and Umatilla projects, Oregon.

During the fiscal year 1,291 original homestead entries were examined and accepted, 16 assignments of desert-land entries within irrigation projects were accepted, 8 original desert-land entries subject to the reclamation act were examined and accepted, and 12 final desert-land entries approved for patenting.

Forest lieu selections.—There are now pending about 500 selections, involving over 80,000 acres. During the past year 145 were approved for patenting and 37 canceled. Adverse proceedings were directed against 13 selections and hearings had in 40 cases. Decisions in 40 Government contest cases were rendered, 11 of which were in favor of the selector and 29 adverse. The latter are now pending on appeal in the department.

It is believed that selections have been made for all outstanding base lands for which selection is permissible, excepting about 20,000 acres.

Lieu selections for lands in Indian reservations.—Selections have been made of public lands under the act of April 21, 1904, in New Mexico and Arizona of approximately 1,400,000 acres in lieu of lands in Indian reservations, and patents have issued for these lands.

On June 6, 1916, the department decided not to allow any further exchanges under this act, except in some unusual cases which would be found to be of benefit to the Government or where the selector may have acquired some equity. Under these exceptions there are still outstanding approximately 50,000 acres of base land in Arizona and approximately 10,000 acres of base land in New Mexico subject to exchange under said act.

Chippewa logging, Minnesota.—Operations in this field are drawing to a close. The results have been most satisfactory. The cutting has exceeded the estimates by over 350,000,000 feet, or nearly 50 per cent.

The ninth and probably the last public sale of this timber was held during the past year of tracts left unsold from previous sales, bringing $13,030.19, an average of $5.82 per thousand feet.

The total amount cut during 13 years of logging is 1,268,956,646 feet, for which $8,983,657.22 were paid, and in addition thereto charges for interest amounting to $25,191.54 were collected. The average stumpage price of the timber scaled was $7.07½ per thousand feet. The total expense of the logging operations for 13 years has been $383,760.76, which is 4.27 per cent of the receipts from the timber.

Minnesota drainage act.—There have been approved for patenting during the fiscal year 1,142 entries, mostly made for 160 acres each, the limit allowed to one purchaser. The area thus patented was in the neighborhood of 182,500 acres. There are still pending 125 of these entries.

This act has provided a method by which large areas, open to entry years ago and not taken because of their swamp condition, have been disposed of, and the lands placed on the tax list.

Public sale of Indian lands.—A sale of lands in the Uintah Reservation was held at Provo, Utah, June 18, 1917. The offering consisted of 386,218 acres, listed for sale in 1,632 tracts. There were sold at said sale 931 tracts, embracing 200,684 acres, for the total sum of $151,644.50.

On November 22, 1916, the property known as the Ojo Caliente Reservation, in Socorro County, N. Mex., and the buildings thereon, were sold at public auction for $13,000. All things considered, this was a good price.

Public sales have been announced to take place during the coming season of timber lands in the former Siletz Indian Reservation, Oreg.; the undisposed of lands in the Crow Indian Reservation, Mont.; scattered lands in 15 townships in the former Coeur d'Alene Reservation, Idaho; Flathead lands in the Kalispell and Missoula districts, Mont.; also of unsold lands in the former Rosebud Reservation in Gregory County, S. Dak.

Opening of public and Indian lands.—One of the largest reservations opened during the past year was the Fort Assinniboine abandoned military reservation, Mont., under special act of Congress, the entryman being required to pay $2.50 per acre for the land entered. The schedules described 93,605 acres of agricultural lands, and 2,188 acres of coal lands.

The first reclassification and reappraisement of the Flathead Indian lands has been approved and regulations adopted for the opening of the lands. The schedules include 2,693 acres of nontimbered lands and 4,983 acres of timbered lands. The nontimbered land was appraised at $7,150.72, an average of $2.65 per acre; the timbered land at $24,706, an average of $4.95 per acre.

The lands in the diminished Colville Indian Reservation, Wash., to the extent of 422,144 acres, were opened to homestead entry in July, 1916.

Town-site and town-lot entries.—The demand for town lots for business purposes is an indication of the growth and prosperity of the country. One hundred and sixty-one of such entries were pending at the beginning of the year, and during the year 882 entries were made, 989 were approved for patenting, leaving at the close of the year 54. In addition, six regular town-site entries were received

and approved for patenting. There were pending at the beginning of the year 21 entries, involving Alaska missions, Alaska sites for trade and manufacture, park and cemetery sites, and 11 additional were received during the year; of these, 19 were approved and 13 are yet pending.

Public sales of town lots in former Indian reservations show an aggregate result of $70,997, while public sales in reclamation projects in Montana aggregate $6,050.75.

Town sites in Alaska.—The town site of Anchorage, on the line of the Government railroad, was surveyed into lots in June, 1915, the first sale of lots being held in July and August of that year, at which 1,887 lots were sold for $177,105. The terms of sale were one-third cash, the balance to be paid in four equal annual installments, the initial payment derived from the first sale amounting to $60,773.55. In July, 1916, 1,059 lots were sold in the town site and its additions for $212,020 on the same terms, the annual payments amounting to $82,445.55. A third addition has been subdivided into lots and will probably be offered for sale during this season. This town has a population of about 5,000, and there is no reason why, under the present regulations for the disposal of lots therein, the town should not continue to rapidly increase.

Two Government additions to the town site of Seward, Alaska, have been subdivided into lots and blocks, of which 115 lots were sold on September 11, 1916, for $26,630, on terms of one-half cash and the other half to be paid in one year from date of sale.

In July, 1916, 56 lots were sold in the town site of Matanuska for $8,930.

In August, 1916, 354 lots in Nenana town site, at the junction of the Nenana and Tanana Rivers, were sold for $132,525.

June 20, 1917, 47 lots were sold in the town site of Wasilla for $5,540.

Abandoned military reservations.—A number of abandoned military reservations will be disposed of as soon as the preliminary work of surveying, preparing the plats, and appraising the lands is completed. Most of these reservations are to be disposed of under the act of July 5, 1884, under which the lands are to be offered at public sale for cash at not less than the appraised price. Among such reservations are Bayside, in Monmouth County, N. J.; Batton Island, Fla.; Virginia Key and Key Biscayne, Fla.; Reservations Nos. 23 and 24 on the Narrows, near Tacoma, Wash.; and Fort Sabine, Cameron Parish, La.

Railroad grants.—Railroad and wagon road selections were received during the year to the amount of 986,596.05 acres, as against 1,958,444.32 acres in 1916. There were patented 1,586,807.98 acres, as against 2,208,178.82 acres in 1916.

Rights of way.—During the year 44 applications for railroad rights of way were approved, 37 over unsurveyed lands accepted for filing, and 24 rejected.

Of applications for "all other rights of way," 528 were received, as against 672 the previous year, of which but 17 remain pending office action.

Forfeited rights of way.—The work of clearing the records of outstanding rights of way, which have either been forfeited under the several forfeiture acts, or subject to forfeiture by judicial decree, has been actively prosecuted, and 376 of these cases have been considered, leaving the office up to date on this class of work.

Power permits.—During the year past 5 preliminary and 10 final permits were issued, for which the various permittees paid into the Treasury of the United States a total of $2,918.30. Permits under the act of 1901 (31 Stat., 790) and easements under the act of March 4, 1911 (36 Stat., 1253), were issued, which, together with second payments on permits theretofore issued, netted the Government $8,407.33. A list of permits issued accompanies the commissioner's report, together with the respective amounts received thereon. During the past year 44 applications for permits were received, as against 24 the previous year.

Power site and public water reserves.—During the past year 156,353 acres were withdrawn for power purposes under the act of June 25, 1910 (36 Stat., 847), by 83 orders, as against 161,973 acres during the previous year.

June 30, 1917, 201,708 acres appear withdrawn for public water reserves, as against 193,273 acres the previous year. On the same date there were 2,429,097 acres withdrawn for power purposes, as against 2,352,652 acres the year previous.

The total withdrawals under the act, including power and waterhole withdrawals, is 2,630,805 acres, as against 2,545,924 acres last year.

The Carey Act.—A general tendency is noted among the States which have Carey Act segregations to eliminate lands which are not susceptible of irrigation, or where the project is of doubtful feasibility, resulting in the restoration of 132,074.25 acres to homestead and other forms of entry.

Applications for patent have been received totaling 47,926.93 acres, and patents have been issued for 43,184.83 acres.

Desert-land entries.—Under the act of March 4, 1915 (38 Stat., 1161), provision was made for the perfecting of desert-land entries, where water was not available for reclamation of the land, either by compliance with the homestead law or by purchase; and since the passage of this relief act 5,590 cases have been disposed of.

During the present year there were patented 1,752 desert-land entries, covering an area of 277,432.33 acres.

"Ten chain" lots in Imperial Valley.—During the past fiscal year 183 applications were filed to purchase "10 chain" lots in Imperial County, Cal., under the act of March 3, 1909 (35 Stat., 779), and during that time 70 applications were approved for patenting, involving a purchase price of $8,531.80.

Irrigation projects.—During the past year 130 reports on irrigation projects have been considered, resulting in favorable action on 86 projects, involving 416 desert-land entries; adverse action on 42 projects, affecting 969 desert-land entries; and 38 closed without definite conclusion, because no pending entries were dependent thereon.

Irrigation in Imperial County, Cal.—The execution of a contract between the Secretary of the Interior and the Imperial Laguna Water Co., contemplating the irrigation of the Imperial mesa lands, California, through the diversion of water from the Colorado River at the Laguna Dam on the Yuma reclamation project, is noted.

State selections and State grants.—During the past year 691,831.20 acres of indemnity school land selections and 542,094.81 acres of selections under grants in quantity for specific purposes received departmental approval.

A final adjustment of the overdraft of school indemnity selections standing against the State of California has been effected, a matter which has been pending for a number of years. A statement in detail as to the several items involved and the result of the settlement in each case is fully set forth by the commissioner.

Swamp and overflowed lands.—Patents issued during the year past to seven States for 22,585.48 acres. Applications for the identification of 57,795.10 acres as swamp were rejected. New claims for 3,027.31 acres were filed.

Indian allotments.—Marked progress has been made in setting aside individual holdings for Indians, and during the past year 5,839 trust patents, embracing 945,874.73 acres were issued to Indians. This is an increase of nearly 87 per cent over the preceding year.

Repayments.—During the past year 1,215 accounts were stated, allowing repayment of $106,888.42, and during the same period 434 claims for repayment were denied. The number of claims allowed and repaid includes four accounts for the repayment of $4,753.66, money received in connection with claims for coal lands in Alaska, and repaid in pursuance of section 3, act of October 20, 1914 (38 Stat., 741).

National forests.—There are now 152 national forests, embracing 176,252,160 acres, of which approximately 87 per cent is public land. The net increase in national-forest area since the beginning of the fiscal year is 311,809 acres. During the fiscal year 437,461 acres

have been excluded from national forests, and the public land subject to disposition is 353,788 acres restored to settlement and entry.

Agricultural entry of coal lands.—The act of February 27, 1917 (39 Stat., 944), is a new departure in legislation, authorizing the allowance of agricultural entries for lands withdrawn or classified as coal lands, or valuable for coal deposits in Indian reservations, which may have heretofore or may hereafter be opened to settlement and entry. Among the coal lands which have been opened by the President's proclamations under this act are lands in the Fort Peck, Crow, and Fort Berthold Indian reservations.

INDIAN AFFAIRS.

Declaration of policy.—A new and far-reaching policy has been declared in the interest of the competent Indian, who will no longer be treated as half ward and half citizen, but will be recognized as capable of controlling his property and exercising fully his personal rights. Beyond the general principle, competency or incompetency will, of course, be determined by the facts involved in individual and exceptional cases. The essential announcements of the new policy are as follows:

1. *Patents in fee.*—To all able-bodied, competent, adult Indians there will be given, as far as may be under the law, full and complete control of all their property. Patents in fee shall be issued to all adult Indians who may, after careful investigation, be found competent, provided that where deemed advisable patents in fee shall be withheld for not to exceed 40 acres as a home.

2. *Indian graduates.*—Indian students, when they are 21 years of age or over, who complete the full course of instruction in the Government schools, receive diplomas, and have demonstrated competency will be so declared.

3. *Sale of lands.*—A liberal ruling will be adopted in the matter of passing upon applications for the sale of inherited Indian lands where the applicants retain other lands and the proceeds are to be used to improve the homesteads or for other equally good purposes. A more liberal ruling than has hitherto prevailed will hereafter be followed with regard to the applications of noncompetent Indians for the sale of their lands where they are old and feeble and need the proceeds for their support.

4. *Certificates of competency.*—The rules which are made to apply in the granting of patents in fee and the sale of lands will be made equally applicable in the matter of issuing certificates of competency.

5. *Individual Indian moneys.*—Indians will be given unrestricted control of all their individual Indian moneys upon issuance of patents in fee or certificates of competency. Strict limitations will not be placed upon the use of funds of the old, the indigent, and the invalid.

6. *Pro rata shares—Trust funds.*—As speedily as possible their pro rata shares in tribal trust or other funds shall be paid to all Indians who have been declared competent, unless the legal status of such funds prevents. Where practicable the pro rata shares of incompetent Indians will be withdrawn from the Treasury and placed in banks to their individual credit.

7. *Elimination of ineligible pupils from the Government Indian schools.*—In many of our boarding schools Indian children are being educated at Government expense whose parents are amply able to pay for their education and have public-school facilities at or near their homes. Such children shall not hereafter be enrolled in Government Indian schools supported by gratuity appropriations except on payment of actual per capita cost and transportation.

This radical departure from the paternalistic idea in Indian administration will be followed consistently with its underlying purpose to release from governmental restraint those competently worthy of freedom and to prepare by wise supervision the incompetent for such release as rapidly as possible.

This new policy will liberalize administrative practice in various ways and will tend distinctly toward a reduction in governmental expenses. It will also accomplish a larger attendance of Indian children in the State public schools and place the burden of child education largely upon Indian parents when they are amply able to bear it.

Enlistments and Liberty bond subscriptions.—The bureau, in cooperation with the States, conducted the registration of Indians for the military census, requiring its employees to serve wherever necessary without compensation and directing superintendents to aid in securing full consideration to the exemption claims of Indians. Aside from voluntary enlistments by citizen Indians fully 1,000 young men among the students and ex-students of the schools offered service in the National Guard or some branch of the military.

The purchase of Liberty loan bonds from individual Indian moneys not drawing more than 3½ per cent greatly interested many Indians not only as a safe investment but as a concrete expression of patriotism. The following subscriptions were definitely reported: By 525 adult Indians, $3,273,450; by 851 Indian minors and students, $1,334,400; to which 1,147 employees in the Indian Service added $178,750, making a total of 2,623 subscriptions for $4,780,400 worth of bonds.

Education.—Substantial progress has been made in reducing to a working basis the tentative course of study and, by the aid of visiting inspectors, working out such plans and reorganization in the various schools as approximate a uniform system for Indian education. Examinations and promotions of pupils under uniform test were conducted at the close of the year on the same dates for all schools, which

was generally satisfactory, barring the necessity for some 17 of the schools to close before the end of the year, because unable to comply with the law limiting annual expenditures for support and education to $200 per pupil. It is very difficult for some schools to keep within this limit and pay recent prices for all necessary supplies. The process of eliminating children not properly entitled under the declaration of policy to the privileges of Government boarding schools has been initiated and will lead to the larger enrollment of pupils for whom no other school facilities are afforded and to the closing of some schools in certain localities with consequent reduction of expense.

It will also increase largely the attendance in public schools of children of nontaxpaying Indians on contracts for payment of tuition by the Government. This attendance outside of the Five Civilized Tribes was nearly trebled during the year. The educational qualification for competency recognized by the new policy will materially increase the number of Indians to be released from control or given fee patents under the law, and will prove a strong incentive to pupils to acquire independence by completing a full course of training. Seventy-five graduates were reported at the close of the year as candidates for certificates of competency. Two thousand two hundred and eighty-five public-school districts enrolled 18,185 Indian children in the territory of the Five Civilized Tribes during the year.

Farming and stock raising.—An intensive food campaign was waged in contribution to the national resources during the world war, resulting in a general awakening and endeavor among the Indians to do their part in the emergency, and in an increase of cultivated acreage from 25 to 50 per cent greater than ever before. Reports show that on 73 reservations the Indians cultivated this season 472,156 acres as compared with 358,796 acres last year, an increase of 113,360 acres, or 31.6 per cent. Practically every reservation showed a gain, the highest being 100 per cent and the lowest 5 per cent. Following aggressive and anticipative measures, between 40,000 and 50,000 acres of additional surplus land will be leased for next season's crop. The conservation feature of the campaign was emphasized by forwarding to the different reservations and schools for distribution among employees and Indians 12,000 copies of pamphlets issued by the Department of Agriculture and the National Emergency Food Garden Commission on canning and drying fruits and vegetables. A woman expert in canning and drying was also sent to a number of places to give special instruction to the Indian women and girls. The agricultural interest, strengthened by Indian fairs, is extending to State fairs, where Indians have won many premiums, including first prize on wheat in South Dakota, awarded to a full blood.

Experimentation in the Southwest has developed increasing Indian culture of cotton. Besides the natural increase of live stock on the various reservations, there were added last year 610 bulls, 3,127 heifers, 522 cows and calves, and 376 mares under a new plan of purchase, resulting in a saving of some $20,000. Systematic measures were begun for the improvement of all dairy herds, including scientific care, treatment, and test of their product. The suppression of contagious diseases among Indian live stock was carried on aggressively during the year, with special progress in the eradication of dourine among the horses.

Reimbursable funds.—Indians on about 85 reservations are now availing themselves of reimbursable funds for the purchase of live stock, farming implements, and supplies. The Government controls the purchases under this plan, saving in many cases one-half of the cost over purchase by the Indians individually. Tribal herds of cattle developed from these funds in previous years have proven profitable and will eventually yield an increase for making repayments to the Treasury of the sums expended. They will, moreover, greatly further the self-support of the Indians when the time comes for turning the stock over to them.

Health and employment.—The health problems of the Indian Service are concerned with tuberculosis, trachoma, infant welfare, and epidemics of contagious diseases. The great need is for better sanitary conditions in Indian homes, and strenuous efforts are continually made to accomplish this. The work of the various sanitoria is making steady gains against disease and the conditions producing it. The forces are prepared for an active educational campaign, with special vigor against tuberculosis among the Five Civilized Tribes, from which important results are expected. The difficulty in the control of trachoma is that the disease is fed from the older Indians, who are slow to submit to treatment. However, returned students from the schools where treatment of pupils is compulsory are doing much to overcome the prejudice of the parents. The handling of epidemics is much more difficult among the Indians than among the whites, because the former do not understand the need of quarantine and other precautions against the spread of disease. They are learning the value of such preventatives as vaccination, however, and in many localities are accepting encouragingly the teaching of sanitary preparedness. The unabated efforts for infant welfare have brought most gratifying results. "Baby contests" have become the star attractions at all Indian fairs, so much so that this year they will receive more systematic attention, and standard score cards will be issued and used for registering the children contesting. These will be carefully graded by physicians and suitable certificates issued thereon to the parents.

Employment for Indians is becoming more stabilized, especially for those of educational training, and the vocational instruction of the schools is bearing fruit in the mechanical occupations. The number of young men in agricultural pursuits has rapidly increased, but a more recent and very significant fact is the large number entering tractor and automobile factories, electrical and engineering plants, and many other lines where they must compete with the best of white workmanship and develop both technical skill and a certain moral steadiness of character in order to advance. This they are doing in a surprising degree, as reports on many individual cases show.

Suppression of intoxicants.—This work is making more successful headway by the aid of increasing legislation. Prohibition is now, or soon will be, in legal effect in the following States wherein Indians reside or contiguous thereto: Arizona, Arkansas, Colorado, Idaho, Iowa, Kansas, Michigan, Montana, Nebraska, North Carolina, North Dakota, Oklahoma, Oregon, South Dakota, Utah, and Washington. That portion of section 5 of the act of Congress approved March 3, 1917, known as the Reed amendment, will prove most helpful because of its prohibitory effect on the liquor traffic in interstate commerce into any State or Territory the laws of which prohibit the manufacture or sale therein of intoxicating liquors for beverage purposes. Several of the States mentioned have also passed laws controlling the sale of peyote and other narcotic preparations. It is noteworthy that in some instances where the Indians were allowed to vote on the question of prohibition, their suffrage was registered strongly in its favor. Special success has been won during the year in breaking up bootlegging in certain localities which had hitherto been offensive strongholds for this practice. In the distribution of approximately $9,000,000 as per capita payments to Indians in Oklahoma, and in other like payments to Indians throughout the country, special safeguards were instituted against their use of these funds for intoxicating purposes and with generally very gratifying results.

Allotments, fee patents and purchases.—In addition to allotments continued on the various Sioux reservations and the Gila River and Colorado River reservations in Arizona, 456 allotments comprising over 132,000 acres were made to the Fort Peck Indians, 20 allotments covering 15,000 acres made on the public domain were approved to Turtle Mountain Indians, and a large number of reallotments were made on various reservations, usually securing to the Indians a better character of land. During the year 2,203 applications for fee patents were approved, involving 275,553 acres valued at $5,000,000. Of these, 576 were full bloods and 1,627 mixed blood allottees. Although work under the declaration of policy was only commenced, 470 Indians with 37,600 acres of land were released from Government control. Reports are rapidly reaching the office for furtherance of the

work under this policy and are being investigated. Purchases of land have been made for numerous bands of homeless, nonreservation Indians and some 8,000 acres for about 4,100 homeless California Indians.

Indian heirship.—The department acts as a probate court in determining heirs to Indian estates, and in considering wills acts also as a guardian of the Indian and his estate. During the last fiscal year 2,851 estates were finally determined and 123 wills received approval, this exclusive of Osage wills which are considered under a law applicable to them alone.

Oil and gas interests.—Scattering tracts of Osage oil lands in Oklahoma, aggregating 9,120 acres, which were being drained by wells on adjacent property to the reduction of their mineral value were sold at public auction for a bonus considerartion of $1,997,600 and royalties of from 16⅔ per cent to 20 per cent, depending upon the size of tracts and daily production. The Osage Reservation at the close of the year had wells producing 9,943,919.45 barrels of oil, of which the Osage tribe received as royalty 1,643,223.68 barrels and total receipts from oil and gas leases for the year approximating $5,000,000. In the last few years the oil and gas industry outside the Five Civilized Tribes and the Osage Nation has had a steady increase. The advance in the price of oil has stimulated the leasing of Indian lands and made 1917 the banner year for such industry. Exclusive of the Osage Nation and the Five Civilized Tribes, leases were approved on seven reservations in Oklahoma and one in each of Washington, Wyoming, and South Dakota, involving 219,615 acres, with leases pending in these districts on 27,550.93 acres. Leases on 24,080 acres of tribal lands were also approved. In addition to rentals and royalties, bonuses are paid directly to the Indian lessors varying in amount from a few dollars to several thousand dollars.

Forestry.—The efficient lookout and patrol system now maintained on Indian reservations having large timber areas is largely instrumental in preventing heavy annual fire losses. Appraisal of timber resources involving much incidental data has been conducted during the year, and among the large sales of timber made were two on the Klamath Reservation of about 430,000,000 feet at the unit price of $3.57 per thousand feet, board measure, for yellow pine; two of 60,000,000 feet on the Flathead Reservation at prices from $3.65 to $4 per thousand; about 18,000,000 feet of mixed species in northern Michigan, besides other smaller sales. At the Menominee Indian mill, where 17,000,000 feet of lumber were manufactured under Government management Indians earned more than $80,000 in wages during the year. The assets of the Menominee Indians have now been increased equal to the value of this whole manufacturing plant inventoried at more than $1,000,000.

Irrigation.—During the year the Wapato Dam on the Yakima River was completed at a total cost of about $144,000, estimated to irrigate 120,000 acres, of which 57,000 are now in cultivation, yielding a product for the year estimated at a value of $6,000,000. Steps have been taken to supply water from the storage provided by the Roosevelt Dam for 631 allotments on the Salt River Reservation. A diversion dam across the Truckee River completed at a cost of over $26,000 will irrigate 3,000 acres on the Pyramid Lake Reservation, Nev. On the Crow Reservation, in Montana, irrigation projects costing $1,000,000 are now supplying 69,000 acres. On the Wind River Reservation, Wyo., the irrigable area is now 80,777 acres, on which the value of crops grown last year was $264,700. Important underground developments in the Southwest have produced during the year wells and springs for stock-watering purposes of great value to the Navajo Indians and the Papagos in southern Arizona.

Miscellaneous activities.—The demand for blankets made by the Navajo Indians exceeds the supply more than usually because the better price for wool makes its sale in the raw state more profitable than when woven into blankets.

In the leasing of tribal lands grazing fees have been increased wherever conditions justified. Practically all available lands on the San Carlos and Fort Apache Reservations formerly leased at $1.50 per head now bring $2.40 for cattle and $3 for horses.

Important road and bridge work has been in construction in the Navajo, Kaibab, Shoshone, and Fort Yuma Reservations.

The active demand for motion pictures of Indian life is encouraged only to the extent of permitting pictures of present-day scenes.

Complaints regarding nonpayment of debts by Indians are diminishing. The employment of Indians for exhibition purposes has been uniformly discouraged.

The payment of cash annuities, except where mandatory by law, has not been generally encouraged, but during the year a per capita payment of $300 was made on the Crow Reservation and $200 to the Fort Peck Indians, chiefly to aid them in larger farming operations favorable to the food campaign.

The small funds provided for relieving distress among Indians have been chiefly used for the benefit of the needy on reservations, placing as far as possible the burden of caring for nonreservation Indians on the white communities in which they reside.

The majority of Indians on the various Sioux Reservations, as provided by the act of March 2, 1889, and amendments thereto, have received issues of implements and stock or the cash value thereof, from which excellent results have followed.

Recent legislation affecting the prorating of tribal trust funds permits the withdrawal of shares of noncompetent, able-bodied Indians for expenditure under supervision for their benefit. This opens the way for thousands of noncompetents to be established on their allotments with supplies furnished to start them toward self-support.

There has been an increasing demand for individual Indian money, due principally to the high cost of living, but largely for minors' funds by parents or guardians, who have expended their own and now seek the use of the children's money. These cases require careful study according to their individual merits to the end that the minor's funds shall be retained at interest for his future benefit except under circumstances which fully justify their present use.

The new system of bookkeeping, as recommended by the Bureau of Efficiency and designed to show the actual cost of the various activities by expenditures of money and property rather than by cash disbursements alone, has been adopted and is adding effectiveness to the accounting work of the office.

Indians in Oklahoma.—During the year the Office of the Superintendent of the Five Civilized Tribes handled 1,000,000 pieces of mail and $42,000,000, involving the erection of 180 houses and barns at a cost of $126,492.11; the purchase of more than 2,000 acres of land for homes, costing $52,437.10; the sale of nearly 500,000 acres of tribal and allotted lands for over $2,000,000; an investment of $1,741,550 in Liberty loan bonds for individual Indians, besides investments in other loans and purchases; the disbursement of $7,429,066.10 in per capita payments; the removal of restrictions against alienation from 155,428.39 acres of land; the collection of $4,407,909.62 on account of royalties from leases; and much other work pertaining to leases, investigations, miscellaneous matters, etc.

The enrolled members of the Five Civilized Tribes now number 101,506, of which 26,774 are full bloods; 10,393 are mixed, having one-half or more Indian blood; 40,934 are of less than one-half blood, and include intermarried whites; and 23,405 are freedmen. Twenty-five thousand one hundred and sixty-seven are still under restrictions. Under the laws of Oklahoma, every enrolled minor of the Five Civilized Tribes has a share in the tribal lands and moneys, which accounts for the great number of guardianships, the nearly 53,000 probate cases now docketed in the county courts of eastern Oklahoma, and the consequent heavy work of probate attorneys, who in the past year appeared for the Indians in 25 criminal actions, 261 civil suits, involving property worth $474,000, besides over 18,000 regular cases; issued citations to 4,470 delinquent guardians, resulting in the removal or discharge of 1,762 guardians and the filing of nearly 3,000 new bonds, amounting to $3,331,693; pre-

vented losses to Indians in the sum of $1,514,314; conserved for them through bank deposits and investments $3,424,226; and saved to minors and others $1,514,314.

Comparative data.—The bureau shows comparative facts as follows: In 1911 the Indians cultivated 388,025 acres, and last year 678,529 acres; in 1911 they raised crops valued at $1,951,000, sold stock valued at $900,000, realized from native industries, such as basket making, blanket weaving, etc., $847,556; and last year they raised crops valued at $5,293,719, sold $4,583,083 worth of stock, and increased the value of their native wares to $1,206,826. The value of all live stock owned by the Indians has risen from $17,971,209 in 1911 to $28,824,439 last year. The Indian wage earners for private individuals in 1911 were 3,204, and last year the number thus engaged increased to 6,902.

PENSION OFFICE.

New legislation.—The work in the Pension Bureau has during the year been considerably affected by new legislation.

Medal of honor roll.—By the act of April 27, 1916, providing for the Army and Navy Medal of Honor Roll, a special pension of $10 per month for life, payable quarter-yearly, in addition to any other pension under any existing or subsequent law, was granted to every person over 65 years of age who was placed on said roll. By that law it was made the duty of the Secretary of War and the Secretary of the Navy to certify to the Commissioner of Pensions the names of persons entered on said roll, and that certificate is made full and sufficient authority to the Commissioner of Pensions for the payment by him to the beneficiary named in each certificate. Under this law there were entered on the pension roll 351 names. The amount paid in 1917 on account of this act was $41,582.

Final removal of Confederate disabilities.—Section 4716, Revised Statutes, provided that no money on account of pension should be paid to any person, or to the widow, children, or heirs of any deceased person who in any manner voluntarily engaged in or aided or abetted the late rebellion against the authority of the United States. That limitation was removed in specific cases by numerous statutes, and on August 29, 1916, it was finally repealed.

Ashbrook law.—The act of September 8, 1916, known as the Ashbrook law, increased the pension of a large number of widows from $12 to $20 per month, and extended the limitation of marriage to the soldier from June 27, 1890, to June 27, 1905, thus giving title to pension to many widows to whom former laws denied it, and also made ample provision for the remarried widows of soldiers of the Civil War. The work under this law was entered upon in the Pen-

sion Bureau with great vigor for the purpose of expediting and distributing the generosity of the Government to the widows who were made beneficiaries by said act. Up to and including June 30, 1917, pensions of 157,248 widows have been increased under the first section of the act. Under the second and third sections 51,481 claims have been filed, of which 11,811 were admitted and 5,445 rejected. In the other cases calls were made for testimony and the claims are still pending.

Indian war survivors.—On March 4, 1917, there was approved an act to pension survivors of certain Indian wars and the widows of those engaged therein. This act, in connection with the acts of July 27, 1892, and February 19, 1913, grants pension at the rate of $20 per month from the date of its passage. Up to and including June 30, 1917, under this act 6,517 claims were accepted and classified by the Law Division, almost all of which are still pending awaiting detailed information called for as to identity of party and character and length of service.

War of 1917.—Up to June 30, 1917, 11 claims had been presented based on service in the present war. At the time this report was written the number of such claims had very materially increased, and it is feared that, because of military operations which are anticipated, the number may further increase very rapidly. Even if peace should be declared, the mere fact of the existence of such a large number of men as are in the Army, Navy, and Marine Corps would alone give reason to expect many claims on account of injury from accident and disability from disease.

The pension laws are applicable to all those who serve in the present war in the Army, Navy, or Marine Corps. When any officer or enlisted man of the National Guard is drafted into the service of the United States, the law passed June 3, 1916, provides that he shall be entitled to all the benefits of the pension laws. That same provision is made applicable to any officer or enlisted man drafted into the service of the United States pursuant to the provisions of the joint resolution of July 1, 1916.

Where disability or death is due to aviation accident in the Navy or Marine Corps, a double pension is allowed. No special provision has been made with reference to such service in the Army.

Number of pensioners.—There were on the roll at the end of the fiscal year 673,111 names, a net loss of 36,461 from the total of 709,572 on the roll at the beginning of the year.

The number of Civil War soldiers on the roll June 30, 1916, was 362,277, and on June 30, 1917, 329,226, showing a decrease of 33,051.

The number of deaths of Civil War soldiers in 1917 was 33,232, which lacked 1,020 of being as many as occurred in 1916, when the number of such deaths was 34,252.

The number of Civil War widows on the roll June 30, 1916, was 286,080, and on June 30, 1917, 284,216, showing a decrease of 1,864.

The deaths of widows, minor children and dependents numbered 20,130 in 1917, as against 19,957 in 1916.

The highest number of Civil War soldiers on the roll was in 1898, when there were 745,822.

The highest number of Civil War widows on the roll was in 1912, when there were 304,373.

Of the War of 1812 there were surviving on June 30, 1917, 109 widows.

Of the War with Mexico there were on June 30, 1917, 384 survivors and 3,422 widows.

Of the War with Spain the total number of original claims allowed by the bureau is 39,564.

The number of Spanish War soldiers on the roll at the end of the fiscal year is 28,275.

Unexpended balances of appropriations.—The unexpended balances of appropriations at the close of the year were as follows:

For Army and Navy pensions	$2,174,856.63
For fees and expenses, examining surgeons	29,373.12
For salaries	42.135.13
For per diem and expenses of special examiners	496.56
Total	2,246,861.44

Disbursements for pensions.—The amount disbursed in the payment of pensions during the year was $160,895,054, as against $159,155,090 for the preceding year.

The amount appropriated for payment of pensions for the fiscal year 1916 was $163,000,000, as against $164,000,000 for the preceding year. A deficiency appropriation of $5,000,000, largely due to the act of September 8, 1916, was made in addition to the original appropriation of $158,000,000 for the fiscal year.

The number of pensioners residing in foreign countries in 1917 was 4,085. The amount paid to pensioners in foreign countries was $929,768.

Certificates issued and applications filed:

Pension certificates issued on admitted claims during the fiscal year	46,439
Reissues in lieu of lost pension certificates (duplicates) during the year	2,068
Accrued pension orders issued during the year	11,375
Widows' increase orders, act of Sept. 8, 1916, issued during year ending June 30, 1917	157,363
Total	217,245

There were received and classified in the law division during the year 98,759 applications of all kinds, 51,481 of which were under sections 2 and 3 of the act of September 8, 1916.

Military bounty land warrants.—During the last year there was issued one warrant for 120 acres.

There were 5 claims on hand at the beginning of the year and 11 received during the year, of which 1 was allowed, 6 were rejected, 1 was abandoned, and 8 are still pending.

The following statement shows the total number of warrants of all classes issued by this bureau and the total number of acres granted up to July 1, 1917, viz:

	Number.	Acres.
War of the Revolution	16,663	2,666,080
War of 1812	29,471	4,891,520
Act of 1847	88,274	13,213,640
Act of 1850	189,146	13,168,560
Act of 1852	11,992	694,400
Act of 1855	263,155	34,159,670
Total	598,701	68,793,870

Special acts granting pension or increase of pension.—During the year 25 omnibus bills were passed granting pension or increase of pension, representing 4,178 individual cases. In 62 of such cases the beneficiary died prior to the approval of the bill granting the relief. Requests to the number of 3,211 by the pension committees of the Senate and House of Representatives for the transmittal of claims were complied with.

Division of pension.—Under the act of March 3, 1899, providing for division of pension of resident pensioners of the United States who have deserted their wives or children, or who are inmates of soldiers' or sailors' homes, altogether 16,627 claims have been filed; in 9,449 of them the division of pension was allowed, and in 7,060 the division was denied. On July 1, 1916, there were 178 such claims pending, and during the year 438 claims of this class were filed or renewed; 359 were allowed, 139 were denied, and 118 were pending on June 30, 1917.

Under the act of August 8, 1882, of claims of wives and children of pensioners undergoing imprisonment, or insane without a guardian, 23 were allowed and 16 were not allowed.

Of claims under the act of February 2, 1909, of the dependents of pensioners confined in St. Elizabeths Hospital 13 were allowed and 4 rejected.

Offenses and recoveries.—During the year 32 cases were presented to the Department of Justice for prosecution on account of offenses against the pension laws. These were in addition to those which had been presented in the prior year and not all of which had been acted upon. Indictments were found in 48 cases, 31 cases were brought to trial, and in 30 cases convictions were had, and in 1 there was an

acquittal. The acquittal was in the case of a man charged with impersonating an officer of this bureau. Five cases were disposed of by nolle prosequi; in 7 cases presented to the grand jury no indictments were found; at the close of the year there were 57 cases pending for prosecution.

Two civil suits were compromised for $2,000 and $900, respectively, under the direction of the Department of Justice. The sum of $3,018.40 was recovered without resort to court proceedings. The foregoing does not include recoveries, through the board of review, from pensioners on former wrongful adjudications. This has amounted in two years to the sum of $120,663.05.

Economies.—Letters are now single spaced; and since many thousands are written in the Pension Bureau each year, it will be a considerable saving. Where whole manila sheets were used with the files of cases, half sheets are now used, serving the same purpose. Thousands of file slips which were used and discarded have been again utilized by crossing out the marks on the side once used and using the opposite side of the slip. In other respects efforts are made to effect savings where they will in no manner interfere with the efficiency of the work.

Ages of employees:

Number of employees in the Bureau of Pensions July 1, 1917, who were in the classified civil service	1,013
Number between 70 and 80 years of age	172
Number over 80 years of age	19
Total number eligible for retirement (based on age 70)	191
Per cent eligible for retirement (based on age 70)	18.85
Age of oldest employee	86
Average age of all employees	57

Reduction of the force.—The legislative, executive, and judicial appropriation act for the fiscal year 1918 made provision for 24 fewer employees than for the year ending June 30, 1917. The appropriation act of 1918 limits appointments and promotions to 25 per cent of the vacancies occurring in any grade during that fiscal year. Fourteen appointments were made during the fiscal year in the classified service, 12 in the Pension Bureau, and 2 in the secretary's office. For the next fiscal year there are 1,091 employees, as against 1,115 for the past year.

Attorneys.—There are 27,628 persons or firms entitled to recognition as attorneys or agents before the bureau, 352 of whom were admitted, and 5 restored during the fiscal year; 8 were disbarred; 8 relinquished their right to practice; 2 were suspended from practice; 13 were prohibited under section 109 of the Criminal Code; 64 died; and in one case the admission to practice was canceled and revoked. Powers of attorney and fee agreements examined num-

bered 10,484. Contests between attorneys for recognition in claims were settled in 946 cases.

Nonpayment of pensions to residents of Germany.—Prior to the beginning of 1917, because of the difficulty in transmitting mail to pensioners residing in Germany, the Pension Bureau had made arrangements with the Secretary of State by which pension vouchers and checks were transmitted in the diplomatic pouch. Difficulties continued to multiply, and when diplomatic relations were suspended, February 3, 1917, the bureau was unable to deliver such checks. Therefore, on February 5, 1917, an order was issued providing that all such vouchers, checks, and any other communication for persons within the limits of Germany should be withheld during the discontinuance of diplomatic relations with that country, and that for the present consideration need not be given to pending claims from applicants residing in such country. There was also in said order the statement that the same order should apply to any other foreign country upon the discontinuance with it of diplomatic relations. The rights of pensioners residing in Germany were not determined by the Commissioner. In the absence of any other regulation by Congress, payment of accumulated pension would be made to them upon their being in territory where they could be reached by the ordinary course of mail.

Photostat.—Photostat copies of documents were made aggregating 12,006 pages, making a total of 21,801 pages since the photostat machine was installed, December 4, 1915. During the year the sum of $406.70 was received for photostat copies of documents furnished under the act of August 24, 1912.

PATENT OFFICE.

During the fiscal year ending June 30, 1917, there were filed 68,690 applications for patents for inventions, 2,666 applications for patents for designs, 264 applications for the reissue of patents previously granted, 8,714 applications for registrations of trade-marks, 884 applications for registration of labels, and 320 applications for registration of prints, the total number of such applications being 81,538. This represents an increase of 917 over the applications filed in 1916. There was, however, an increase of 1,342 in the number of applications for inventions.

In addition, 2,158 appeals and 34 disclaimers were filed. During the year 44,179 patents (including 1,686 designs and 165 reissues), 6,126 registrations for trade-marks, 781 registrations for labels, and 342 registrations for prints were granted. The number of patents which expired during the year was 24,777. The number of allowed applications which forfeited for nonpayment of final fees was 10,504.

The total receipts of the office during the year were $2,317,519.72, and the total of expenditures were $2,095,138.68, the net surplus of earnings over expenditures being $222,381.04. The grand net surplus since the establishment of the present patent system in 1836 is now $8,219,071.35.

BUREAU OF EDUCATION.

Scope of the bureau's work.—The work of the Bureau of Education comprises two types of service. The first consists of reporting on the status of education and educational progress in the United States and in foreign countries. This involves the collection and compilation of statistics, the maintenance of an extensive educational library, the carrying on of a voluminous correspondence, and the publication in reports, bulletins, miscellaneous documents, and circulars of the information collected by the bureau. The second type of service is in the nature of special projects. These are in part educational investigations, in part propaganda for improving educational conditions, and in part administrative. They are carried on primarily by the bureau's specialists, with occasional assistance from workers in education outside the bureau. This phase of the bureau's work has increased considerably in recent years.

Statistics.—During the year the bureau collected, tabulated, and summarized returns from 20,759 schools and school systems, including 48 State school systems, 1,241 city school systems, 574 universities and colleges, 530 professional schools, 12,003 public high schools, 2,203 private secondary schools, and other institutions of miscellaneous type and grade.

Correspondence.—First-class mail matter received by the bureau during the year amounted to 137,805 pieces, as compared with 120,078 pieces in 1916, and 86,817 in 1915. This increase of nearly 60 per cent in the work of the bureau has been accompanied by practically no increase in the facilities for handling it.

Library.—The Bureau of Education Library is the most extensive educational library in the United States. During the year the library collection was increased by 2,014 volumes and pamphlets, 6,200 numbers of serial publications, and 7,950 numbers of periodicals.

Publications.—There were 422,063 copies of reports and bulletins distributed during the year, and approximately 1,000,000 copies of brief mimeographed or printed circulars. The printed documents included the Annual Report of the Commissioner for 1916, 49 issues of the Bulletin, and 434 miscellaneous circulars and reprints.

The bulletins issued during the year dealt with such subjects as State pension systems for public-school teachers, the Wisconsin county training schools for teachers in rural schools, public facilities

for educating the alien, accredited secondary schools in the United States, vocational secondary education, commercial education, the social studies in secondary education, university training for public service, manual arts and home-making studies in typical cities, adult illiteracy, the cooperative system of education, gardening in elementary city schools, recent movements in college and university administration, rural school supervision, the district agricultural colleges of Georgia, together with the reports of the educational surveys of Iowa, North Dakota, Washington, Wyoming, Colorado, and colored schools.

Educational surveys.—Numerous agencies have made educational surveys in the past five years. This service is, however, most appropriately rendered by the Bureau of Education, because the bureau represents no locality or special interest, because its officers have the widest acquaintance with educational conditions, and because it is a public instrument supported by the whole country. The growing recognition of these facts brings an ever-increasing demand for the bureau to render this service. Sixteen different survey projects have been carried on during the year. In every case the surveys made by this office have culminated in constructive recommendations. For the most part these recommendations have received the serious consideration of local school officers and of legislatures. Many of them have already been incorporated in educational legislation.

Other projects.—In the field of higher education several studies have been brought to completion and published, including a bulletin on the statistics of State universities and colleges and a study of registration and student records in smaller colleges. Decisions have been rendered by the specialist in higher education as to 530 universities, colleges, and schools for inclusion in the list of institutions to be accredited by the United States Military Academy.

In school administration three projects have been undertaken—a study of the current practice of city school administration, a study of school legislation in 1916, and a digest of State laws relating to libraries.

The campaign for the improvement of rural school conditions was continued during the year. Important rural conferences were held at Lincoln, Nebr., Philadelphia, Pa., Rock Hill, S. C., to be followed by similar conferences at St. Paul, Minn., Hot Springs, Ark., Denver, Colo., Helena, Mont., and Chico, Cal.

Conferences on industrial education were held under the bureau's direction at Nashville, Tenn., Indianapolis, Ind., and Kansas City, Mo. Conferences on home economics were held at the bureau's call in Washington and in Boston.

An important project of the bureau during the past year has been the intensive supervision of gardening in eight cities in Virginia,

North Carolina, and Tennessee by one of the specialists in school and home gardening. Another specialist was detailed for some weeks to Atlanta, Ga., where he successfully introduced gardening under school supervision. Courses for the training of garden teachers were given by specialists of the bureau in several of the summer schools. The war has given special point to the bureau's plan of home gardening directed by the school.

Two studies have been carried to completion by the division of kindergarten education—one a bulletin on kindergarten legislation, the other a study of the methods of kindergarten supervision. Important legislation bearing on kindergartens has been passed in five States, largely in response to the bureau's efforts in this field.

The work of the bureau in fostering education in the home has increased considerably. During the year a new reading course, that in American history, was prepared, and about 1,000,000 copies of reading courses were distributed. Approximately 6,000 persons are now enrolled in the National Reading Circle.

The bureau is undertaking to promote training in citizenship and the stimulation of civic consciousness through the activities of three separate divisions—civic education, immigrant education, and community organization. The special agent in civic education has assisted in bringing to completion the report of the committee on social studies in secondary education. As a result of this and similar studies the States of Pennsylvania, Connecticut, Massachusetts, and New Jersey have enacted legislation providing for the establishment of courses for training in the duties of citizenship. The division of immigrant education, in addition to its regular work of correspondence and circularization, has organized the National Committee of One Hundred on Americanization, with a view to coordinating the efforts of the numerous committees and associations, National, State, and local, now working in this field.

The work of the division of foreign educational systems has included, besides the usual section in the annual report of the Commissioner of Education, special studies of secondary agricultural schools in Russia, higher technical institutions in foreign countries, military training of the youth of school age in foreign countries, and a study of vocational education in the countries at war.

Alaska.—In its work for the natives of Alaska the Alaska division of the bureau maintained 68 schools, with an enrollment of 3,600 pupils. Instruction in matters pertaining to health, industrial training, gardening, and commercial education was emphasized. Efforts have been made to improve living conditions in the villages, to lessen the death rate, and to render the natives better able to cope with the conditions which confront them.

For the fiscal year 1915–16 Congress appropriated $25,000 to provide for the medical relief of the natives of Alaska; in addition $19,000 of the appropriation for the education of natives of Alaska was used for that purpose, making a total of $44,000 for medical relief during the year. A well-equipped hospital was maintained at Juneau, with a physician in charge and three nurses in attendance, and small improvised hospitals were continued at Nulato and Kanakanak.

Education and the war.—Immediately upon the declaration of war the Bureau of Education put its facilities for reaching schools and school officers at the disposal of other Government agencies dealing more directly with war preparation. Cooperation was effected with the Department of Agriculture and the Food Administration and other agencies in the special war tasks of increased food production, food conservation, and industrial preparedness. The bureau organized and led the movement for continued educational opportunities during the war, specially exerting its efforts in maintaining compulsory school laws and in urging higher education for women and for men below the age of the selective draft. Reports received at the bureau show that the campaign for school attendance has already met with measurable success, and that this country has been spared, in part at least, the lamentable falling down of educational standards noted in other countries at the outbreak of war.

Recommendations.—The commissioner recommends increases in the salaries of administrative officers of the bureau. He asks for an assistant commissioner who shall also be a specialist in secondary education, additional specialists in higher education, specialists in school and home gardening, and additional specialists in commercial education. He urges more adequate provision for investigation of school hygiene and sanitation, adult illiteracy, child training in the home, school administration in cities and towns, and exceptional children. He asks for a specialist in educational theory and practices to serve as the director of investigations, additional specialists and assistants in foreign and domestic systems of education, and a comparatively large increase in the numbers of clerks and other employees to make it possible for the bureau to do adequately the work imposed by law and by public demand upon a national bureau of education. A special recommendation is for funds to enable the bureau to cooperate with State and county school officers in establishing and maintaining demonstration rural schools as a means of solving what is still the most important educational problem of the Nation—the education of the country boy and girl.

For Alaska the commissioner asks a larger appropriation to enable the Secretary of the Interior to provide for further medical

and sanitary relief of the natives of Alaska and authority to sell some of the reindeer belonging to the Government.

GEOLOGICAL SURVEY.

Scope of the survey's work.—The changes in the scope of the operations of the Geological Survey have been only those needed to make the geologic and topographic surveys and investigations of surface and underground waters throughout the United States contribute more directly to the national problems of preparedness. The special utilization of the statistical work of the survey well illustrates this development during the past year, since large use has been made of the data collected through many years concerning the mineral resources available whenever the demand came for increased production. The total appropriations for the fiscal year 1917 aggregated $1,605,520. The roll of survey members holding appointments from the Secretary numbered, at the end of the year, 934, an increase of 62.

Geologic surveys.—During the year 134 geologists made field investigations in 47 States, Canal Zone, and the West Indies, and 69 per cent of the appropriations were spent in public-land States. The detailed geologic surveys cover 6,701 square miles, the reconnaissance geologic surveys 28,500 square miles, a total of 35,201 square miles. Systematic investigations of metalliferous deposits were made in Alabama, Arkansas, California, Colorado, Idaho, Minnesota, Missouri, Montana, Nevada, New Mexico, Oklahoma, Tennessee, Utah, Virginia, Washington, and Wyoming. Cooperative work was done with the geological surveys of 25 States and with the Bureau of Mines, Bureau of Standards, Office of Public Roads and Rural Engineering, Bureau of Fisheries, Coast and Geodetic Survey, Forest Service, Weather Bureau, Smithsonian Institution, Lighthouse Service, Office of Indian Affairs, War Department, Navy Department, and Carnegie Institution.

Surveys in Alaska.—Twelve parties at work in Alaska covered 5,100 square miles with reconnaissance geologic surveys, 636 square miles with detailed geologic surveys, 9,700 square miles with reconnaissance topographic surveys, and 65 square miles with detailed topographic surveys. The geologists also investigated special problems in productive mining districts, the results of which can not be stated in terms of area.

Statistics of mineral production.—The survey continued the policy of making the annual report on the mineral resources of the United States for the calendar year 1916 more than a statistical compilation by recording and interpreting industrial progress, and especially by giving full descriptions of the sources from which the mineral output of the country is obtained. The separate reports on each min-

eral product are printed as advance chapters of the volume and widely distributed, and at the close of the fiscal year 11 chapters had been published or were in press. Mid-year statements covering the first half of the production of 1916 of some of the principal minerals were published early in the fiscal year and preliminary statements of production of the principal minerals for the whole year were given wide publicity in the form of press bulletins during the latter part of December, 1916, and early in 1917. The entrance of the United States into the war served to increase the already growing demand for information concerning our mineral resources, and a bulletin entitled "Our Mineral Supplies," has been prepared to meet this demand. The survey has also been called upon by the Council of National Defense, the Tariff Commission, and other Government institutions for information, most of which was already available or easily obtainable. The survey began during the year to issue a monthly summary of petroleum statistics, also a monthly statement of rail shipments of coal and coke, and at the close of June, a weekly statement of coal production, with an analysis of causes of change in rate of output. These are statistics that possess a news value and serve as an index of current industrial conditions.

Topographic surveys.—New areas amounting to 20,103 square miles were mapped topographically, making the total area of the United States surveyed to date 1,257,623 square miles, or 41.5 per cent of the country. Areas aggregating 2,377 square miles were resurveyed, making the total area surveyed or resurveyed during the year 22,480 square miles. These surveys were made in 31 States, 16 of which cooperated in the work. The technical field force numbered 155, and in addition 40 technical field assistants were employed. The results of topographic surveys in Alaska are given elsewhere.

Water resources.—At the end of the year 1,197 gaging stations for measuring the discharge of streams were being maintained in 41 States, Alaska, and Hawaii. Investigations of underground waters have been made in 14 States and in Alaska, and investigations of the present and possible use of both surface and underground waters have been made in connection with the classification of public lands, especially with reference to their use for power under Government permit or for agriculture under the enlarged-homestead, desert-land, or Carey acts. In the hydrographic work 23 States and Hawaii also the Reclamation Service, Forest Service, Weather Bureau, Office of Indian Affairs, Engineer Corps of the War Department, Navy Department, Department of Justice, the city of San Francisco, and the city of San Diego cooperated largely in the study of the flow of certain streams. About 62 per cent of the appropriation of $150,000 was spent on the public-land States, largely in stream gaging. The technical force engaged in the work on water resources numbered 73.

Land classification.—Lands aggregating 1,321,989 acres was classified as to coal character, of which 370,449 acres were appraised as coal land and made available for purchase. New withdrawals of 903,791 acres of oil lands were made, and 176,311 acres previously withdrawn were restored to entry. Areas amounting to 2,530,309 acres were classified as oil-shale land and two oil-shale reserves aggregating 132,024 acres were created for the benefit of the Navy.

Classification of phosphate land resulted in the restoration as nonphosphate land of 80 acres of public land and the classification as phosphate land of 24,656 acres of Indian lands. Other areas amounting to 103,115 acres, chiefly within former or existing Indian reservations, were classified as to their content of minerals.

During the year 13,133,851 acres in 14 States were classified as nonirrigable and were so designated under the enlarged-homestead acts. The total area thus designated to date amounts to 275,633,861 acres.

During the year there was a total classification of more than 18,000,000 acres. The total areas withdrawn during the year for all purposes were 1,757,335 acres, and the total restorations were 1,895,243 acres.

Publications.—The books distributed during the year numbered 607,101, the topographic maps 676,526, and the geologic folios 21,235, a total of 1,304,862. Of these publications 475,036 maps and 17,551 folios were sold. The amount of money received and turned into the Treasury from the sale of publications was $35,388.79. During the year 203 reports were published and 46 were reprinted. The Survey published 5 geologic folios, 86 new or revised topographic maps, and 7 State maps, a total of 93 maps, besides 140 reprints. The total editions of the folios and maps aggregated 803,397. A large amount of additional engraving and lithographic work was done by the Survey under contract for other departments through the Government Printing Office. Of special importance was the map printing for the War and Navy Departments, the engraving division of the Survey holding its personnel and equipment available for rush orders for military or naval use.

RECLAMATION SERVICE.

Increase in cultivation.—More than usual progress in the utilization of the works of the Reclamation Service has been made during the fiscal year ending June 30, 1917. Not only has the actual number of settlers and homes increased, but a greater increase is shown in the area actually irrigated and cropped and in the value of the crops produced. The progress is shown in the following table:

Year.	Irrigable acreage.	Irrigated acreage.	Irrigated farms.	Cropped acreage.	Crop value.
1909	730,000	382,000	9,000	.....	.....
1910	880,000	475,000	12,000	415,000	$12,500,000
1911	1,015,000	560,000	14,000	470,000	13,000,000
1912	1,160,000	645,000	15,000	590,000	14,500,000
1913	1,200,000	700,000	16,000	650,000	16,000,000
1914	1,250,000	770,000	18,000	700,000	16,500,000
1915	1,500,000	857,000	20,000	800,000	19,000,000
1916	1,600,000	1,010,000	23,000	925,000	35,000,000

The area irrigated in 1916 and the value of the crops raised thereon show a very large contribution to the agricultural products of the country which has been greatly increased in the season of 1917 as a result of increased acreage served, a larger proportion cultivated and higher crop values. Similar increases are expected for the immediate future.

Principal operations during the year.—The principal construction operations at present are drainage works, which are in progress on a number of the projects. Irrigation construction proper is confined mainly to the extension and completion of existing distribution systems, the chief exceptions being the construction of a large storage reservoir on the Tieton River in Washington, and the construction of the Fort Laramie unit on the North Platte project, Wyoming and Nebraska.

The principal activities of the Reclamation Service, however, are the operation and maintenance of systems that have been built and are delivering water to agricultural lands. The policy of turning this operation over to the water users, authorized by the reclamation extension act, is being followed wherever they are willing and able to undertake it. The only places where this has been actually carried into effect are on the north side of the Minidoka project and on some new irrigation districts recently organized on the Yakima project.

No new projects have been commenced during the fiscal year. The Lawton project in Oklahoma, which has been under investigation for several years and authorized under certain conditions, received an appropriation for the fiscal year 1917 of $51,000. An executive condition was imposed that the lands to be irrigated should be formed into an irrigation district competent to contract for irrigation works in accordance with the reclamation laws. This condition was fulfilled and the contract was about to be signed and construction commenced when the needs of the Fort Sill military post for an increased water supply led to a change of plans, and work was stopped at the request of the inhabitants of Lawton and vicinity. The project may come up for later consideration after the war if the military needs should be then reduced.

The Salt River project, Arizona, was the second project authorized under the reclamation law, and was one of the first upon which

construction began. Over $10,000,000 has been invested there from reclamation funds, and one of the great reservoirs of the world has been constructed on the Salt River to store the floods of that river and its tributaries, holding more than two years' supply for the lands to be irrigated. A concrete diversion dam with canal headings on both banks and a large and intricate canal system have been provided from which water for irrigation has been delivered by the United States for over eight years. During this time there has been no water shortage, and the works are in an excellent state of efficiency. Large power developments have been carried out as an adjunct to this project, and besides furnishing a large amount of power for pumping upon the project, are producing a gross revenue from commercial power of over $300,000 per annum, which under the operation of the law are credited to the project.

The irrigable lands as a whole are very fertile and remarkably convenient for irrigation, having a good slope for the transportation of water, requiring very little leveling, and producing large results in proportion to labor expended. It is one of the most productive and wealthiest projects of the service.

This project has been practically completed for three or four years, the reservoir having been completed in 1910. In January, 1917, public notice was issued requiring repayment of the Government investment, in accordance with the provision of law, in 20 years by the beneficiaries in small annual installments beginning December 1, 1917. Vigorous protest against this requirement was made by the water users, and after considerable discussion and negotiation an offer was made to the water users' association by which the receipts from power would be credited upon the annual accruals of construction charges instead of being credited to the project as a whole. A contract embodying this provision was submitted to a vote of the water users and accepted by a vote of 48,883 against 3,100. Under its provisions the receipts from the power plant will be sufficient to pay all the construction charges for seven or eight years and more than half of the charges for the balance of the period of payment. The immense advantages of such a contract are appreciated by the leading men of the valley, and it is expected that the acceptance of the contract will end the controversy over payments, at least for several years.

On the Yuma project, Arizona and California, water is now available for all the irrigable lands included in the project which can be irrigated by gravity, and public notice has been issued, the first payment falling due December 1, 1917. Work is in progress in the revetment of the levees with rock to protect this valley from attack by the Colorado River. Drainage works on the Arizona side are also in progress.

The Orland project, California, has been practically completed, with the exception of a small amount of canal lining and some provision for the care of waste water. Public notice was issued in 1916 and the first payment was made in full on the day it fell due by a check from the water users' association, which assumes all liability and inconveniences from delinquencies and defaults. This illustrates the cordial cooperation that has always existed upon this project.

The Grand Valley project, Colorado, is under construction. The main canal has been nearly completed; this and the main laterals are being tested and primed and water has been delivered to about 4,000 acres during 1917 on a rental basis. The completion of the lateral system is being held in abeyance pending the settlement of lands already under canals and an effective demand for further extension.

The Uncompahgre Valley project, Colorado, is completed to the extent that water can be delivered to about 100,000 acres of land, about one-half of which has been irrigated and cropped for several years. The issue of public notice covering these lands has, however, been postponed at the request of the water users.

The Boise project, Idaho, has in the main been completed, although two large extensions are contemplated for early construction. Arrowrock Dam regulates the flow of the Boise River and stores about 250,000 acre-feet of water, which is diverted about 18 miles below and carried in a large canal to irrigate lands in the upper valley and to discharge a large percentage of its water into the reservoir far down the valley known as Deer Flat Reservoir, for storage for lands farther down. The water supply as thus regulated is capable of supplying from 20,000 to 30,000 acres of land not yet reached by canals. Land under canals amounting to about 220,000 acres can be served with water, and public notice has been issued announcing construction charges, the first installment of which falls due December 1, 1917.

The Minidoka project, Idaho, has in the main been completed, although it is susceptible of several extensions. The gravity portion of the project has been making payments under public notice for several years, and the south side or pumping project has also recently begun payments under public notice. The gravity portion has been formed into an irrigation district which has taken over the operation and maintenance of the system under contract authorized by the reclamation extension act.

The enlarging of Jackson Lake Reservoir under contract with the Kuhn Irrigation & Canal Co. and Twin Falls Canal Co. has been completed, and provides for the storage of water for the north side and south side Twin Falls tracts.

The Huntley project, Montana, will require the building of additional laterals to serve properly the new lands in the eastern part of the project. Drainage work is also in progress on this project.

The Milk River project, Montana, is under construction. The feed canal from St. Mary River to Milk River, which will furnish irrigation water for the Milk River Valley, has been completed and the work of seasoning and priming has been prosecuted. Some water has been delivered during the past summer for irrigation in Milk River Valley. The diversion of Swift Current Creek into St. Mary Lake has been completed, and work is under way on the Sherburne Lakes Dam to store the water of Swift Current Creek for use in the Milk River Valley. The Vandalia Diversion Dam has been in operation and furnishing water for the canals at that point. Water is being stored in the Nelson Reservoir, which receives it from the Dodson South Canal.

The Sun River project, Montana, is under construction. Irrigation has been contributed on the Fort Shaw unit on the south side, and the main canals and laterals on the north side are being primed ready for use. This is difficult work, but it is probable that some water can be delivered for irrigation in 1918.

On the North Platte project, Nebraska and Wyoming, the south side or Fort Laramie unit is being constructed; the heavy work on the first 30 miles of the main canal is well advanced and mostly completed or contracted. Some lands can be irrigated in 1918 from this canal.

On the Truckee-Carson project, Nevada, water is being stored in Lahontan Reservoir and Lake Tahoe and delivered for irrigation. A movement is on foot to form an irrigation district of this project for the purpose of facilitating the construction of drainage works and for other purposes.

On the Carlsbad project, New Mexico, the principal work in progress is drainage work. Construction repairs required by the damage done by floods to the old spillway in 1915 have been completed, but to carry out this work it was necessary to draw down the reservoir, and this caused some embarrassment from water shortage in 1917, which was an exceptionally dry year.

The Rio Grande project, New Mexico and Texas, is under construction. The Percha diversion dam and the canal system in the Rincon Valley are being constructed. An irrigation district has been formed in Texas and one is being formed in New Mexico to carry through drainage work.

The North Dakota pumping project is being operated only to the extent of the power plant, which is delivering power under contract to the city of Williston. Steps are being taken by the landowners to organize an irrigation district under which it is hoped to provide for the operation of the pumping system.

On the Umatilla project, Oregon, construction has been pushed on the west extension, upon which it is now possible to deliver water to

most of the land. The entire canal system will be lined with concrete, and this is nearly completed. Water is being delivered on a rental basis to the west extension.

On the Klamath project, Oregon and California, lands uncovered by the lowering of Tule Lake are under public notice and water is being delivered to them as well as to the old lands of the project. Surveys and negotiations have been made looking to the possible development of the Pine Grove and Sand Hollow units in cooperation with the landowners. The development of Lower Klamath Marshes is being prosecuted by the landowners, who have formed a drainage district.

On the Yakima project, Washington, construction of the storage dam at Lake Keechelus has been practically completed. Construction has begun on a large reservoir on the Tieton River, a tributary of the Naches. Pumping plants have been built for Outlook, Snipes Mountain, and Grandview irrigation districts.

On the Shoshone project, Wyoming, construction has been pushed in the development of additional lands in the Frannie unit. A large area of this will be under public notice this year, and water has been delivered to some of these lands in 1917. Settlement is following closely upon the construction of irrigation works and the project is prosperous and promising.

SUMMARY OF CONSTRUCTION RESULTS.

The following table gives in concise form many of the items which have been accomplished:

Summary of construction results, June 30, 1915.[1]

Items.	To June 30, 1917.		To June 30, 1916.		Increase.	
Lands:						
Estimated area of projects on completion[2]	*Acres.* 3,091,792	*Farms.* 62,451	*Acres.* 3,117,862	*Farms.* 60,367	*Acres.* [3]—26,067	*Farms.* 2,084
Estimated area to which service was prepared to supply water	1,797,811	37,719	1,690,244	34,826	107,567	2,893
Under contract—						
Water rights	597,631	12,724	542,960	11,536	54,671	1,188
Rental contracts, etc	778,308	16,410	764,743	15,882	13,565	528
Total	1,375,939	29,134	1,307,703	27,418	68,236	1,716
	Acre-feet.		*Acre-feet.*		*Acre-feet.*	
Reservoir capacity available	9,193,800		9,035,160		168,640	
Canals, ditches, and drains:	*Miles.*		*Miles.*		*Miles.*	
Canals over 800 second-feet capacity	401		382		19	
Canals 301 to 800 second-feet capacity	665		664		1	
Canals 50 to 300 second-feet capacity	1,678		1,580		98	
Canals less than 50 second-feet capacity	7,226		6,891		335	
Total canals	9,970		9,517		453	
Waste-water ditches	456		422		34	
Drains, open	575		492		83	
Drains, closed	149		120		29	
Total	1,180		1,034		146	
Grand total	11,150		10,551		599	

[1] Includes data on Indian projects.
[2] Including areas furnished temporary water supply.
[3] Decrease due to revision of estimates.

Summary of construction results, June 30, 1915—Continued.

Items.	To June 30, 1917.		To June 30, 1916.		Increase.	
	Number.	*Length (feet).*	*Number.*	*Length (feet).*	*Number.*	*Length (feet).*
Tunnels	94	141,987	89	133,333	5	8,654
Storage and diversion:	*Cubic yards.*		*Cubic yards.*		*Cubic yards.*	
Dams—						
Masonry	2,083,376		2,071,372		12,004	
Earth	9,818,103		9,684,493		133,610	
Rock fill and crib	1,155,763		984,138		171,625	
Total	13,057,242		12,740,003		317,239	
Dikes and levees:	*Miles.*	*Cu. yds.*	*Miles.*	*Cu. yds.*	*Miles.*	*Cu. yds.*
Length and volume	94.5	4,430,190	92.8	4,190,106	1.7	240,084
Canal structures:	*Concrete.*	*Wood.*	*Concrete.*	*Wood.*	*Concrete.*	*Wood.*
Costing over $2,000 number	902	134	838	129	64	5
Costing $500 to $2,000 do	1,866	430	1,633	395	233	35
Costing $100 to $500 do	7,946	4,794	7,197	4,383	749	411
Costing less than $100 do	13,754	51,617	9,980	48,008	3,774	3,609
Total	24,468	56,975	19,648	52,915	4,820	4,060
Bridges:	*Number.*	*Length (feet).*	*Number.*	*Length (feet).*	*Number.*	*Length (feet).*
Steel	104	7,002	98	6,325	6	677
Combination	412	11,924	389	11,439	23	485
Wood	4,966	108,226	4,397	94,736	569	13,490
Concrete	335	4,174	300	3,899	35	275
Total	5,817	131,326	5,184	116,399	633	14,927
Culverts:						
Concrete	1,654	80,371	1,381	68,745	273	11,626
Metal	1,346	48,977	1,270	44,437	76	4,540
Terra cotta	920	44,339	796	36,596	124	7,743
Wood	3,068	69,346	2,979	67,147	89	2,199
Total	6,988	243,033	6,426	216,925	562	26,108
Pipe:	*Linear feet.*		*Linear feet.*		*Linear feet.*	
Concrete	556,918		520,447		36,471	
Metal	239,400		215,791		23,609	
Terra cotta (tile)	1,046,770		857,103		189,667	
Wood	331,380		280,270		51,110	
Total	2,174,468		1,873,611		300,857	
Flumes:	*Number.*	*Length (feet).*	*Number.*	*Length (feet).*	*Number.*	*Length (feet).*
Concrete	76	14,870	69	11,544	7	3,326
Metal	674	142,084	483	123,248	191	18,836
Wood	1,679	362,134	1,618	353,932	61	8,202
Total	2,429	519,088	2,170	488,724	249	30,364
Canals lined:	*Concrete.*	*Wood.*	*Concrete.*	*Wood.*	*Concrete.*	*Wood.*
Length miles	296.9	4.1	241.0	3.9	55.9	0.2
Buildings:	*Number.*		*Number.*		*Number.*	
Offices	79		76		3	
Residences	566		548		18	
Power plants	26		25		1	
Pumping stations	67		67			
Barns, storehouses, etc	446		412		34	
Total	1,184		1,128		56	
Wells	*Number.* 391	*Depth (feet).* 34,583	*Number.* 371	*Depth (feet).* 29,612	*Number.* 20	*Depth (feet).* 4,971
Communications:	*Miles.*		*Miles.*		*Miles.*	
Road	902		865		37	
Railroads	83		83			
Telephones	2,822		2,629		193	
Transmission lines	442		438		4	
Power developed:	*H. P.*		*H. P.*		*H. P.*	
Water and steam	47,361		47,311		50	
Excavation:	*Cubic yards.*		*Cubic yards.*		*Cubic yards.*	
Class 1, earth	133,043,727		124,277,054		8,766,673	
Class 2, indurated material	8,882,812		8,382,543		500,269	
Class 3, rock	7,859,995		7,478,669		381,326	
Total	149,786,534		140,138,266		9,648,268	
Riprap cu. yds.	1,527,920		1,297,826		230,094	
Paving cu. yds.	749,395		708,022		41,373	
Concrete cu. yds.	2,942,775		2,860,149		82,625	
Cementi bbls.	2,841,763		2,712,998		128,765	

PROSPERITY OF WATER USERS.

The prosperity on the various projects is generally and rapidly increasing. This is due not only to the increased prices for farm products, but also in some degree to the very favorable terms of repayment provided by the reclamation extension act, which leave the earnings mainly in the hands of the farmers for some years. It is also enhanced by better farming on most projects due to the increased knowledge and skill of the cultivators.

On most projects the water users have appreciated the generosity of the United States Congress in providing liberal terms of repayment; they have bent their energies to putting their farms in shape and are earnestly cooperating with the Reclamation Service in making the projects a success in operation and correcting defects and deficiencies as they develop.

Speeding up crop production.—The response of the project settlers to the appeals of the President and Secretary Lane for greater crop production was instantaneous and thrilling. No more inspiring evidence of the genuine patriotism of a people was ever shown than the wave of enthusiasm which swept over our reclaimed desert valleys.

With all the energy with which they were endowed these pioneers of the West speeded up their work, increased the acreage under plow, and put thousands of acres of new land in food crops. This was done in spite of the fact that it never cost so much in the history of the Nation to put in a crop; that hundreds of farmers' sons volunteered for service in the Army; and that labor is difficult to get. Soon thousands of acres were seeded to corn, wheat, oats, beans, peas, sugar beets, and potatoes, and every vacant lot and back yard had become a garden. Boys' and girls' clubs were formed and the women were mobilizing for producing and saving food crops. At the close of the fiscal year reports were pouring in telling of the big crops in prospect, and in the Washington office plans were being formulated for harvesting and marketing the products.

Although a few thousand carloads of potatoes, for instance, are not a large amount, it may be an abnormal crop for one of these little valleys, and as the available storage capacity on any one project is not large, it is a problem how to gather and care for a huge tonnage in the short period between harvest time and frost. The majority of the farmers have exhausted their credit in producing the food and can not build additional storage. Under a plan proposed by Secretary Lane, the Reclamation Service, the financial and mercantile interests, and the farmers would organize on several of the projects community storage houses designed to take care of the

surplus perishable crops until market and transportation facilities are favorable for distribution.

Under the plan, if carried out, the Service would furnish one-third of the capital invested, the local community another third, and the produce growers the balance in cash or labor. Charges for storage would be at rates which would meet all operating expenses and provide a sinking fund for extensions and interest. These community plants, while under Government regulations, would enjoy special privileges in securing loans to all members on stocks in storage from the Federal reserve bank. Such loans would enable the farmers to meet current obligations and relieve them of the necessity of selling their products at a time when the markets are glutted.

Results of reclamation.—The area irrigated from the Federal works reached well over a million acres in 1916. War prices stimulated development and the area in cultivation on the reclamation projects was brought nearer to the total for which water was available in spite of a substantial addition to the latter by canal extensions and other construction work. With crop yields about equal to those of former years, the great increase in prices raised the gross crop values per acre about 60 per cent.

These facts stand out in the statistics of results for 1916, when the customary crop census was taken on the Government projects. This annual census is largely gathered by the canal riders as the irrigation season draws to a close and water deliveries gradually reduce to the vanishing point. In this way the figures are secured at slight expense and yet tend to be more accurate than an ordinary census, because collected by men in close touch with the irrigators and their operations throughout the season. For the same reason the census is generally restricted to the farms watered from canals operated by the Reclamation Service. A number of the projects embrace tracts to which the Government supplies water in bulk at the heads of canals or laterals not operated by the Reclamation Service. In such cases the lands are not generally covered by the census. In still other cases the United States sells water under the terms of the Warren Act to outlying areas served by private canals. In such cases the water bought from the Government may mingle with unregulated flow, and other conditions bar any accurate figures for the area thus served as a result of the Government construction. However, such data as are available show that the area irrigated from the Government works in 1916 was substantially over 1,000,000 acres.

The 1916 census covered an irrigable area of 1,405,000 acres. Of this 922,800 acres were actually watered and crops were harvested from 858,300 acres, including pasture land. The value of the crops to the farmer was nearly $33,000,000, or $38.25 per acre cropped. The

corresponding figures for the previous year were $18,000,000 and $24.

The principal figures showing the areas and results by projects are given in the following table.

Irrigation and crop results on reclamation projects, 1916.[1]

State.	Project.	Irrigable acreage.[2]	Irrigated acreage.	Cropped acreage.[3]	Value of crops.[3]	
					Total.	Average per acre cropped.
Arizona	Salt River	[4] 212,960	[4] 187,905	173,359	$8,435,719	$48.65
Arizona-California	Yuma	72,440	29,483	28,283	1,435,403	50.75
California	Orland	20,533	9,357	7,011	342,339	48.83
Colorado	Grand Valley	15,000	1,741	1,561	54,692	35.03
	Umcompahgre Valley	77,713	49,273	48,352	1,949,529	40.32
Idaho	Boise	103,370	76,922	72,581	2,327,494	32.07
	Minidoka	120,300	89,900	81,362	2,800,433	34.50
Montana	Huntley	32,271	18,634	18,581	489,071	26.32
	Milk River	40,400	5,518	4,592	70,016	15.25
	Sun River	16,321	4,717	[5] 4,700	[5] 118,990	[5] 18.50
Montana-North Dakota	Lower Yellowstone	42,288	6,020	6,020	124,586	20.70
Nebraska-Wyoming	North Platte	112,016	75,620	74,766	1,633,390	21.85
Nevada	Truckee-Carson	70,915	39,449	38,249	791,446	[6] 20.70
New Mexico	Carlsbad	24,775	16,600	14,500	416,041	28.70
	Hondo	2,918	1,324	1,219	32,200	26.42
New Mexico-Texas	Rio Grande	85,000	62,513	61,818	2,893,740	46.81
Oregon	Umatilla	19,000	5,477	3,900	139,800	35.84
Oregon-California	Klamath	40,000	29,351	29,351	509,865	17.37
South Dakota	Belle Fourche	78,591	48,468	46,909	557,319	11.88
Utah	Strawberry Valley	38,500	30,722	25,066	1,320,135	52.70
Washington	Okanogan	10,099	7,850	5,242	328,385	62.64
	Yakima:					
	Sunnyside unit [7]	93,226	73,000	59,449	4,341,940	73.04
	Tieton unit	34,000	23,000	21,000	1,102,536	52.50
Wyoming	Shoshone	42,816	29,977	28,695	600,903	20.94
Totals for irrigated areas covered by crop reports		1,405,452	922,821	858,291	32,815,972	38.25

[1] Data are for calendar year (irrigation season) except on Salt River project data are for corresponding "agricultural year," ending November 30, 1916. Figures are restricted to irrigated areas covered by crop reports, excluding about 100,000 acres irrigated but not covered by crop reports and relatively small areas on a few projects cropped without irrigation, except as noted for Sun River project.

[2] Area Reclamation Service was prepared to supply water.

[3] Irrigated crops. Excludes small areas on few projects cropped by dry farming.

[4] Irrigable area includes so-called "dry lands" given right to rent water temporarily on account of full reservoir. Irrigated acreage excludes area of towns contracting for water.

[5] Crop reports covered 158 irrigated farms which produced some crops without irrigation.

[6] $30.18 excluding 10,872 acres of wild grass pasture and other fields not in full production.

[7] Includes irrigation districts.

War prices.—All agricultural statistics are now dominated by the effects of the world war. This is strikingly shown in the 1916 figures for the Government projects. The outstanding difference from the reports for previous years is in higher prices and the resulting increase in crop values at the farm. Nearly all products brought much higher prices in 1916 than 1915, the increase in the yearly averages going as high as 100 per cent; the average increase was over 50 per cent. The following figures are for crops that represent three-fourths of the harvested area and total value of all crops grown on the Government projects:

Average farm prices.

Year.	Cereals.	Alfalfa hay.	Potatoes.	Sugar beets.	Cotton.
	Bushel.	*Ton.*	*Bushel.*	*Ton.*	*Pound.*
1915	$0.65	$6.59	$0.45	$5.47	$0.16
1916	.95	10.58	.93	6.14	.24
Per cent increase	45	60	100	12	50

Character of crops.—The kinds of crops grown and their relative areas show no striking change in 1916. Most of the projects are essentially hay and grain producers, incidental to diversified and live-stock farming. In 1916 hay and forage crops, including pasture, but no cereals or grain sorghum, occupied just two-thirds of the acreage and returned just one-half the total crop value. Alfalfa is the great staple, occupying 45 per cent of the area and representing 40 per cent of the crop value. It is grown on every project; on 22 of 25 it occupied more than one-third the cultivated area; on 9, over one-half the total.

The statistics for 1916, as in 1915, show further gradual reduction in the proportionate area devoted to cereals and increase in that of bearing fruit. The cotton industry on the southwestern projects has shown the greatest change directly due to the war. This recent development was considered well started in 1914 with 15,000 acres in production on three projects. The outbreak of the war drove down the price, and the area shrunk to 3,000 acres in 1915. The price then began to soar; 13,000 acres were planted last year, and it is predicted that 30,000 acres will be harvested in 1917.

The attached tabulation lists the principal crops grown on the Government projects, showing their relative importance in the areas cultivated and values produced:

Crop results on reclamation projects in 1916.[1]

Crop.	Cropped acreage.	Per cent of total.	Unit.	Yield.	Average yield per acre.	Average value per acre.	Crop value.	Per cent.
Cereals:								
Barley	43,785	5.1	Bush.	1,094,908	25	$22	$987,179	3.0
Corn	35,189	4.1	...do..	1,070,370	30	27	956,690	2.9
Oats	54,489	6.4	...do..	1,487,519	27	15	835,049	2.5
Rye	1,196	.1	...do..	17,035	14	16	19,423	.1
Wheat	88,896	10.4	...do..	1,902,405	21	28	2,490,625	7.6
Total	223,555	26.1	.....	5,572,237	25	24	5,288,966	16.1
Other grain and seed:								
Alfalfa seed	21,288	2.5	...do..	81,272	3.8	28	599,664	1.9
Clover seed	8,638	1.0	...do..	32,081	3.7	34	295,650	.9
Grain sorghum	7,031	.8	...do..	244,889	35	25	175,604	.5
Flaxseed	689	.1	...do..	4,864	7.2	16	10,722	.....
Millet seed	343	.....	...do..	4,961	14	13	4,546	.....
Total	37,989	4.4	.....	368,067	.....	29	1,086,186	3.3

[1] Data are for calendar year (irrigation season) except for Salt River project, Ariz., data are for corresponding agricultural year ending November 30, 1916. Figures are limited to irrigated areas covered by crop reports, excluding about 100,000 acres irrigated but not covered by crop reports and small areas on a few projects cropped without irrigation.

Crop results on reclamation projects in 1916—Continued.

Crop.	Cropped acreage.	Per cent of total.	Unit.	Yield.	Average yield per acre.	Average value per acre.	Crop value.	Per cent.
Hay and forage:								
Alfalfa hay	381,323	44.5	Ton...	1,225,250	3.2	34	12,957,550	39.5
Clover hay	8,373	1.0	...do..	17,429	2.1	14	119,462	.4
Other hay	23,494	2.7	...do...	35,016	1.5	15	348,443	1.1
Corn fodder	6,022	.7	...do...	42,367	7.0	30	182,461	.5
Peas	455	.1	Bu....	9,215	20	37	17,014	.1
Other forage	32,079	3.7	.....	.....	.....	.....	1,211,078	3.7
Pasture	120,515	14.0	.....	.....	.....	[2] 13	1,549,636	4.7
Total	572,261	66.7	.....	.....	.....	29	16,385,644	50.0
Vegetables and truck:								
Beans	3,285	.4	Bu....	46,327	14	58	190,264	.6
Onions	324	.....	...do...	95,858	296	342	110,628	.3
Potatoes, white	16,228	1.9	...do...	2,858,512	176	163	2,648,523	8.1
Potatoes, sweet	340	.....	...do...	27,701	82	80	27,300	.1
Truck	9,566	1.2	.....	.....	.....	96	919,911	2.8
Total	29,743	3.5	.....	.....	.....	131	3,896,626	11.9
Fruits and nuts:								
Apples	22,530	2.6	Lb....	78,660,576	3,500	67	1,509,372	4.6
Peaches	2,093	.3	...do...	10,953,961	5,200	124	260,061	.8
Pears	2,868	.3	...do...	17,818,663	6,350	169	474,613	1.4
Prunes	490	.1	...do...	2,396,205	4,900	140	68,831	.2
Citrus fruit	1,499	.2	...do...	3,126,160	2,100	98	147,423	.4
Small fruit	1,668	.2	...do...	2,914,345	1,750	85	142,259	.4
Other fruit and nuts	196	.....	.....	224,300	.....	102	20,085	.1
Total[3]	[3] 32,825	[3] 3.8	.....	[3] 121,736,210	.....	84	[3] 2,761,852	8.4
Miscellaneous:								
Sugar beets	29,328	3.5	Ton...	306,596	10.5	64	1,881,449	5.7
Cotton	13,424	1.5	Lb....	4,975,814	338	88	1,198,048	3.6
Cotton seed	7,391	.8	...do...	5,615,572	735	12	94,485	.3
Hops	510	.1	...do...	900,150	1,760	183	93,416	.3
Cane	941	.1	Ton...	2,242	2.4	21	19,351	.1
Other crops	1,891	.2	.....	.....	.....	.....	109,949	.3
Total	53,489	6.2	.....	.....	.....	.....	3,396,698	10.3
Duplication	91,571	10.7	.....	.....	.....	.....	.....	.....
All crops	858,291	100.0	.....	.....	.....	38.25	32,815,972	100.0

[2] This figure does not represent average value of pasture for the year, as considerable areas pastured were also harvested and are included in the duplicated area.
[3] Totals include 1,541 acres, yielding 5,642,000 pounds worth $139,208, not listed under separate fruits.

BUREAU OF MINES.

Duties of the Bureau of Mines.—The Bureau of Mines is charged with the conduct of scientific and technologic investigations relating to the safety and health of workers in the mineral industries and to the prevention of waste and the increase of efficiency in the utilization of mineral resources. As these investigations relate to problems that are general or national in scope and are of fundamental importance, the bureau seeks the cooperation of persons and agencies interested in work for the same ends and constantly strives for coordination of effort.

Cooperative agreements.—In furtherance of its endeavors to promote cooperation and coordination of effort among the agencies working for the increase of safety and efficiency in the mineral industries, the Bureau of Mines, with the approval of the Secretary of the Interior, has entered into cooperative agreements with various

State establishments. During the past fiscal year investigations were conducted under such agreements with the following organizations: Industrial Accidents Commission of California, University of California, Leland Stanford, jr., University, Colorado School of Mines, Columbia University, Cornell University, University of Idaho, Engineering Experiment Station of the University of Illinois, International Railway Fuel Association, metallurgical department of the University of Kansas, National Radium Institute, State School of Mines of the University of North Dakota, Oregon Bureau of Mines and Geology, State School of Mines of the University of Utah, and the University of Washington.

New mining experiment and mine-safety stations.—Under the authority given by the act of Congress (40 Stat., 969) approved March 3, 1915, the Secretary of the Interior during the fiscal year established three new mining experiment stations at Tucson, Ariz., Seattle, Wash., and Fairbanks, Alaska, and three new mine-safety cars, with headquarters at Reno, Nev., Raton, N. Mex., and Butte, Mont., to be under the direction of the Bureau of Mines. At the end of the year the bureau had eight mining experiment stations, eight mine-safety cars, and five mine-safety stations.

The experiment stations are conducting scientific and engineering investigations relating to mining and metallurgical problems. In addition to those named the bureau has mining experiment stations at Pittsburgh, Pa., Berkeley, Cal., Golden, Colo., Salt Lake City, Utah, and Urbana, Ill., and a petroleum experiment station at San Francisco, Cal. The mine-safety stations are engaged in instructing miners and others in first-aid and rescue methods and in rendering assistance after mine disasters. Some of the mine stations are housed in permanent buildings, others on cars that travel from place to place.

War work.—In addition to the regular investigations that had been conducted during previous years, the Bureau of Mines, with the oncoming of war, took up various special investigations relating to work necessary for the national defense. Most of these investigations are being conducted in cooperation with other Government organizations. The director of the bureau was appointed a member of the military committee of the Research Council and of all the committees dealing with fuel and mineral products under the Council of National Defense. The more important special tasks that have been undertaken include investigations relating to the following problems: The most practicable method of producing the supply of nitrates needed in agriculture and warfare; the procuring of raw materials for the manufacture of sulphuric acid; the production of the gases used in war and the development of efficient gas masks; the development of domestic supplies of metals especially needed, such as nickel, manganese, and quicksilver; the procuring of potash

from potash-bearing minerals, and especially from waste materials, such as mill tailings, blast-furnace dust, and the dust from cement kilns; the more economical use of coal; the production and refining of petroleum; and the production, testing, and utilization of gasoline and other petroleum products. In addition the Bureau of Mines, at the request of the Council of National Defense, compiled a census of chemists, mining engineers, and metallurgists throughout the United States in order to enable the Government to select men especially qualified for work requiring particular training or skill.

Divisions of the bureau's work.—The work of the bureau includes investigations of mining and quarrying practice with regard to its safety and efficiency, and the instruction of miners in first-aid and safety methods; the analyzing and testing of fuels to determine how they can be utilized most efficiently; metallurgical researches with reference to the probable utilization of low-grade ores and of the waste products of mills and smelters; the investigation of various minerals and metals in order to ascertain how they can be produced more abundantly or cheaply or of better quality; and problems in petroleum technology, including the reduction of waste of oil and gas in oil fields and the increase of efficiency in transporting, refining, and utilizing petroleum and petroleum products.

Rescue and first-aid work.—The mine rescue or mine safety stations of the bureau are situated at Pittsburgh, Pa., Jellico, Tenn., Birmingham, Ala., Seattle, Wash., and McAlester, Okla. The mine rescue cars have headquarters at Pittsburgh, Pa., Huntington, W. Va., Ironwood, Mich., Evansville, Ind., Pittsburg, Kans., Butte, Mont., Raton, N. Mex., and Reno, Nev. Through these stations and cars the bureau is rendering assistance at mine disasters, is training miners in first-aid methods and in the use of rescue equipment, and is conducting field contests to sustain and stimulate interest in this work. Since the beginning of this work by the Government about 47,000 miners have been trained by the bureau. During the fiscal year the engineers of the bureau investigated 63 accidents of various kinds, 57 being at mines. At the mine accidents 103 men were rescued through the efforts of the miners, company officials, company rescue crews, and State mine inspectors.

Prevention of mine explosions and fires.—Further advances were made in studies of the causes and prevention of mine explosions. Dusts from different mines were tested to determine their explosibility and the effect of rock dust in checking explosions. These tests have shown how the cost of using rock dust may be materially lowered. The improvement of coal-mining methods on the segregated Indian lands in Oklahoma received special attention. The bureau continued to examine and test mining explosives in furtherance of its efforts to prevent mine explosions and safeguard the lives of miners. Dur-

ing the fiscal year 12 explosives were tested for permissibility. Nearly 37,000,000 pounds of explosives approved by the bureau as permissible for use in gaseous or dusty coal mines were used in the calendar year 1916, as compared with 2,000,000 of similar explosives used in 1908, the year in which the testing of mine explosives by the Government began. As a result of the bureau's investigations further progress was made in the manufacture of approved electric switches and motors for mine use and of safer lamps for miners. At the end of the year more than 100,000 portable electric lamps were in use in the mines of this country.

Investigations of the causes of mine fires and the lessening of the fire hazard in mines were continued through the year. Especial attention was given to the disastrous explosion in the Hastings coal mine, Colorado, and to the fire in the North Butte copper mine, Montana.

Through experiments and tests further improvements have been made in oxygen breathing apparatus for use by rescue men in the noxious atmospheres of mines during a fire or after an explosion.

Fuel investigations.—In its campaign for greater efficiency in the use of mineral fuels the bureau is studying the composition and properties of these fuels, and is giving especial attention to the burning of coal in furnaces and the transmission of heat from the fire to the water in boilers. Various facts of much importance in the proper design of furnaces and the best methods of firing coal have been demonstrated. The analyzing and testing of samples of coal purchased for Government use were continued. For the fiscal year the aggregate value of the coal represented by these samples was about $7,800,000.

In addition, the bureau continued to act in the capacity of a consulting engineer for other departments and establishments of the Government by giving advice on the most efficient fuels for use in existing heating or power equipment and on the remodeling of equipment to burn cheaper or more available fuels. The fuel-burning equipment and the conditions under which fuel is used were studied at more than 30 Indian agencies and schools throughout the country. By the use of cheaper available fuels and by other economies recommended the Government can decidedly reduce its annual coal bill.

Investigations of mineral technology.—Various minerals used in the industries of the country, the rare metals, brass and other nonferrous alloys, and the mineral products used as building materials are being investigated by the Bureau of Mines. A cooperative agreement with the National Radium Institute for the purpose of procuring from the mineral carnotite a supply of radium for scientific research and for the treatment of cancer at Government hospitals ter-

minated during the year. Through this cooperation the bureau obtained at an outlay of less than $35,000 a supply of radium for its own use worth more than $200,000. Some special problems of mineral technology included development of larger supplies of quicksilver and manganese from domestic sources, as mentioned elsewhere.

Investigations of stone-quarrying methods and of methods of purifying domestic clays so as to enable them to supplant foreign clays in the production of clay wares were continued with success.

An improved type of electric melting furnace, developed in efforts to reduce the enormous wastes of metal that occur in brass foundries with ordinary methods of melting is now being thoroughly tested on a commercial scale with encouraging results.

Problems connected with the petroleum industry.—The work of the petroleum division of the Bureau of Mines includes problems of production technology, engineering technology, and chemical technology. The problems in connection with the production of oil cover the use of mud-laden fluid to prevent the waste of oil and gas; methods of increasing the recovery from oil sands; oil-field accounting; and the best methods for estimating future production by use of decline curves. The problems of an engineering nature include the study of the storage of petroleum in tanks and reservoirs, transportation problems, the recovery of gasoline from natural gas, and the methods of preventing or extinguishing fires at oil wells or storage plants. The work classified under chemical technology included the inspection of oil-fuel purchases for the War Department, and of gasoline purchased by other Government agencies; the examination of different gasolines sold throughout the country; the improvement of laboratory methods for testing gasoline; further work on the production of gasoline from the heavier oils by the vapor-phase cracking process; and the possibility of producing gasoline under present conditions from the oil shales of the Western States.

One of the most important advances in preventing waste of oil and gas in well drilling—the use of mud-laden fluid to seal any porous beds penetrated by the drill—is being so effectively demonstrated by the bureau that its use is constantly extending, and in many fields is becoming a matter of course. The waste prevented by the use of this method undoubtedly amounts to many millions of dollars annually.

As a result of the investigations of the western oil shales, it is believed that it is now commercially feasible to work selected deposits of shale in competition with oil from oil wells, and that these oil-shale reserves can be considered of immediate importance to the oil industry and to the defense of the Nation.

Metallurgical investigations.—The work being done by the metallurgical division of the Bureau of Mines includes investigations relating to the smelting of sulphide ores, the hydrometallurgy of

gold and silver ores, the treatment of ores by the flotation process, the recovery of the valuable metals from low grade and complex ores by the improvement of old methods or the introduction of new methods, and investigations relating to the iron and steel industries.

Work on the abatement of injurious gases and fumes from smelting plants and the recovery of valuable substances in the fume has continued in cooperation with the Anaconda Smelter Commission. As a result of the work already done under this cooperation, a plant estimated to cost $1,600,000 is being built at the Anaconda smelter for the electrical precipitation of dust and fume. Decided progress is being made in investigations aimed at reducing the escape of sulphur dioxide at smelting plants through the manufacture of sulphuric acid and the utilization of this acid in making phosphate products on a commercial scale and in improving alkali soils.

In the region to be served by the Salt Lake City station of the bureau vast quantities of low grade and complex ores of lead and zinc, many of which carry a little gold or silver, are now unworked awaiting the development of special processes by which they can be treated at a profit. The most important problems under investigation are (1) the recovery from oxidized lead ores of all the valuable metals—gold, silver, and lead—either in concentrated products or as metals, and (2) the treatment of low grade oxidized ores of zinc. Decided progress has been made in the application to the lead ores of a volatilization process—roasting with common salt and precipitating the chloride fumes by electricity. In the treatment of oxidized zinc ores the progress made during the year has been chiefly in dissolving the zinc and precipitating it as oxide.

Iron and steel investigations were somewhat curtailed during the year owing to the demands on the bureau for work on other problems. The most important work done was in continuation of the study of the viscosity of blast-furnace slags, as this work bears directly on the production of desirable pig iron, economy in the use of fuel, and regularity and uniformity in the working of the furnace, and is of especial interest in connection with the smelting of the leaner and more complex iron ores that must be used in increasing amounts as supplies of high-grade ores diminish.

Other metallurgical problems that have received special attention are the extraction of gold and silver from their ores by hydrometallurgical methods and the development of improvements in the metallurgy of the ores of quicksilver.

Chemical researches.—The chemical laboratories of the bureau do such routine work as analyzing samples of coal from mines throughout the United States and samples of coal purchased for Government use, samples of coal dust, coke dust, and road dust collected in coal mines after explosions or in the course of examinations to determine

the explosion hazard; samples of coal, ash, clinker, and fuel from fuel tests; and samples of mine air and of natural gas. In addition to this routine work, different laboratories conducted researches on such problems as the relation of the fusibility of coal ash to the clinkering of coal, the explosibility of coal dusts, special methods of gas analysis, the development of CO_2 absorbents for use in oxygen breathing apparatus and of absorbents for use in gas masks, besides special work relating to the use of noxious gases in warfare.

Other investigations.—A number of investigations that had been in progress for several years were ended during the year. These included a comprehensive review of gold dredging, embracing the construction and operation of dredges and detailed figures of working costs; iron-mining methods in the United States; and the development of the modern blast furnace and present furnace practice. Especial attention was given to work relating to the metals and minerals most needed during the war and to plans for cooperative work to stimulate the domestic production of such minerals.

THE NATIONAL PARK SERVICE.

Organization of the National Park Service.—Prior to this calendar year the national parks and monuments under the jurisdiction of the Secretary of the Interior were under the immediate control of the Secretary's office, and during the years 1915 and 1916 Mr. Stephen T. Mather, as Assistant to the Secretary, had direct administrative supervision of these reservations. He was assisted by the Superintendent of National Parks, who, during the years 1914 and 1915, had his office in San Francisco and during 1916 in Washington. Practically all of the routine work connected with the administration of the parks and monuments was performed in a branch of the Secretary's office under the direction of the Assistant to the Secretary and the Superintendent of National Parks.

On August 25, 1916, the President approved an act of Congress entitled "An act to establish a National Park Service, and for other purposes" (39 Stat., 535), which provided for the establishment in the Department of the Interior of a bureau charged solely with the administration of the affairs of the national parks and national monuments under the jurisdiction of this department. This measure authorizes the appointment by the Secretary of the Interior of a director, assistant director, chief clerk, and other assistants, experts, clerks, etc. The act charges the director of the bureau with the supervision, management, and control of the several parks and monuments.

The functions of the Service are declared to include the promotion and regulation of the national parks and monuments " by such means and measures as conform to the fundamental purpose of said parks,

monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

Complete provision is made for the granting of concessions for the accommodation of the traveling public and for regulating the use of the parks and monuments by visitors.

When the organic act was passed by Congress no appropriation was made to organize the new bureau, and funds for this purpose were not made available until the enactment of the deficiency appropriation act of April 17, 1917 (Public, No. 2, 65th Cong.). Upon the passage of this latter act the Service was organized immediately. It became the ninth bureau of the department.

Officers of the new bureau.—The following officers were appointed in connection with the organization of the new bureau: Director Stephen T. Mather, of Illinois, former assistant to the Secretary; Assistant Director Horace M. Albright, of California, former assistant attorney of the Interior Department; Chief Clerk Frank W. Griffith, of New York, formerly with the chief clerk of the department, attached to his miscellaneous section.

Location of the Service in Washington.—The quarters which have been assigned to the National Park Service are in the Interior Department Building, south section of the fourth floor, east wing.

Jurisdiction of the National Park Service.—There are 17 national parks and 22 national monuments under the jurisdiction of the Service. The total area of the parks is 9,772.76 square miles, or 6,254,568 acres, and the total area of the monuments is 143.32 square miles, or 91,824 acres. Individual parks and monuments, with the date of the establishment of each and their principal scenic. scientific, or historic features, will be found on page 148.

The first national park to be reserved from the public domain was Hot Springs Reservation, set aside by the act of April 20, 1832 (4 Stat., 505). Before it was developed as a national park, however, Yellowstone Park was established under the act of March 1, 1872 (17 Stat., 32).

The national park most recently established is the Mount McKinley National Park in Alaska, set aside from the public domain by the act of February 26, 1917 (39 Stat., 938).

The establishment of the national monuments are authorized under the act of June 8, 1906, "An act for the preservation of American antiquities" (34 Stat., 225). The first monument to be reserved under this act was the Devils Tower Monument in Wyoming, set aside September 24, 1906, by presidential proclamation.

The last national monument to be established by presidential proclamation was the Verendrye Monument in North Dakota, reserved by proclamation of June 29, 1917 (Proclamation No. 1380).

In addition to the national parks under the Department of the Interior, the following national parks are under the War Department: Gettysburg, Vicksburg, Chickamauga and Chattanooga, Shiloh, and Guilford Courthouse National Military Parks and the Lincoln Farm National Park. There are also 2 national monuments under the War Department and 11 national monuments under the Department of Agriculture. The question of placing these other national parks and national monuments under the jurisdiction of this department, in order that the administration and promotion of all of these reservations may be conducted according to a uniform policy, is worthy of serious consideration. The National Park Service act makes no distinction between national parks and national monuments, so far as their administration in the public interest is concerned.

A vigorous educational campaign.—During the past year the National Park Service has continued its work of disseminating information regarding the national parks and national monuments with the view of stimulating travel to these reservations, and much valuable educational work has been accomplished. Over 128,000 copies of the circulars of information regarding national parks were distributed free of charge to the public, 83,000 automobile guide maps were placed in the hands of automobilists during the 1917 season, and 117,000 copies of "Glimpses of our National Parks" were also distributed. Dissemination of these publications greatly stimulated the demand for the scientific publications regarding the national parks, which are for sale by the Superintendent of Documents. These booklets received an unusually wide circulation this year. A new edition of the National Parks Portfolio was recently prepared and has just been delivered by the Public Printer. This document contains a pamphlet on Hot Springs Reservation and the national monuments under the jurisdiction of the National Park Service. The new portfolio, therefore, is much larger and much more attractive than its predecessor. A small charge for this publication will be made by the Superintendent of Documents. An illustrated guide book to Rocky Mountain National Park, by Dr. W. T. Lee, will also be issued in the near future by the National Park Service.

Motion-picture service.—Much attention was given to the advancement of educational work of the bureau by means of motion pictures and lantern slides. Motion-picture film and sets of slides were distributed to universities, colleges, schools, churches, commercial organizations, outing clubs, etc. The equivalent of approximately 348,000 feet of motion-picture film was circulated during the year, and the equivalent of 3,431 slides were constantly in use.

Lectures were delivered occasionally by members of the Service, and data were freely given to amateur and professional lecturers having no connection with the Federal Government.

Traveling picture exhibit.—As an experiment two sets of handsome enlargements of national park pictures were sent to libraries in different parts of the country for temporary exhibition, the libraries paying the cost of packing and shipping. These traveling exhibits of pictures have been in great demand; in fact, they have met with so much favor that we could, without difficulty, circulate several hundred sets were the funds available to manufacture them and place them in circulation. Many sets of pictures for public exhibition could be circulated through the school systems of the country as well as through libraries. It is difficult to conceive of a more practical and effective way of acquainting the American people with their great national playgrounds than by the use of these traveling picture exhibits.

Effective assistance of the press.—The magazines of the country and the public press have devoted much attention to the national parks and national monuments during the year, and the information regarding their natural features and the facilities for touring these reservations that they have disseminated has greatly stimulated travel, and has materially assisted and advanced our educational work. The railroads, express companies, touring bureaus, commercial organizations, etc., have accorded more than usual attention to the promotion of travel to the national parks and monuments, and the work of all of these organizations was very effective. The character of literature issued by them has been excellent and splendidly supplemented the publications of the National Park Service. Several of the railroads reprinted, with the sanction of the department, the pamphlets of the first edition of the National Parks Portfolio.

Additions to national parks literature.—Since January 1 six important additions have been made to the literature on the national parks by the publication of the following books: "Your National Parks," by Enos A. Mills; "Glacier National Park, Its Trails and Treasures," by Mathilde Edith Holtz and Katherine Isabel Bemis; "Mount Rainier. A Record of Explorations," by Edmond S. Meany; "The Top of the Continent," by Robert Sterling Yard; "Going Abroad Overland," by Rev. Dr. David M. Steele; "In the Alaskan Wilderness," by George Byron Gordon.

The national parks conference.—The fourth national parks conference was held in Washington January 2–6, 1917. Problems relating to the administration, improvement, and protection of the national parks and monuments, new park projects, plans for the further promotion of the educational campaign of the service, and many other matters were discussed by Members of Congress, high

officials of the executive departments, and public-spirited men and women from all sections of the country unconnected with the Federal Government who have long been interested in the national park and monument system for its own sake. Simultaneously with the opening of the conference there was opened in the gallery of the National Museum an exhibition of national parks paintings. Altogether there were 28 canvasses, all by artists of high reputation. This exhibition was continued until after the inauguration on March 5.

Visitors.—During the 1917 season there was an enormous increase in the number of tourists visiting the national parks. There was also a large increase in travel to the monuments, but no definite data as to the number of visitors to these smaller reservations is available. The aggregate number of people visiting the national parks this season to and including October 12 was 487,368. The total travel in 1916 was 358,006. The following table shows the travel by parks. For purposes of comparison the travel of the past eight years has also been included in this table.

Visitors to parks, 1910 to 1917.

Name of park.	1910	1911	1912	1913	1914	1915	1916	1917
Hot Springs Reservation	[2]120,000	[2]130,000	[2]135,000	[2]135,000	[2]125,000	[2]115,000	[2]118,740	[2]135,000
Yellowstone National Park	19,575	23,054	22,970	24,929	20,250	51,895	35,849	35,400
Casa Grande Ruin	[1]	[2]450	[2]450	[2]450	[2]500	[2]500	1,909	2,437
Sequoia National Park	2,407	3,114	2,923	3,823	4,667	7,647	10,780	18,510
Yosemite National Park	13,619	12,530	10,884	13,735	15,145	33,452	33,390	34,510
General Grant National Park	1,178	2,160	2,240	2,756	3,735	10,523	15,360	17,390
Mount Rainier National Park	8,000	10,306	8,946	13,501	15,038	35,166	23,989	35,568
Crater Lake National Park	[2]5,000	[2]4,500	5,235	6,253	7,096	11,371	12,265	11,645
Wind Cave National Park	3,387	3,887	3,199	3,988	3,592	2,817	[2]9,000	16,742
Platt National Park	[2]25,000	30,000	[2]31,000	[2]35,000	[2]30,000	[2]20,000	[2]30,000	[2]35,000
Sullys Hill Park	[2]190	[2]200	[2]200	[2]300	[2]500	[2]1,000	[2]1,500	2,207
Mesa Verde National Park	250	206	230	280	502	663	1,385	2,223
Glacier National Park	.....	[2]4,000	6,257	12,138	14,168	14,265	12,839	15,050
Rocky Mountain National Park	.....	.....	.....	.....	.....	[2]31,000	[2]51,000	[2]117,186
Hawaii National Park	.....	.....	.....	.....	.....	.....	[1]	[1]
Lassen Volcanic National Park	.....	.....	.....	.....	.....	.....	[1]	[2]8,500
Mount McKinley National Park	.....	.....	.....	.....	.....	.....	.....	[1]
Total	198,606	224,407	229,534	252,153	240,193	335,299	358,006	487,368

[1] No record. [2] Estimate.

Automobiles in the parks.—All of the national parks are open to automobiles, and this year the motor travel far exceeded that of any previous season; in fact, the increase in automobile travel is from every point of view astounding. Last year there were not more than 30,000 automobiles in the national parks. This year 55,296 automobiles entered the parks to and including October 12. The following table compares the number of automobile licenses issued during the seasons 1914–1917, inclusive:

Automobile and motorcycle licenses issued during seasons of 1914, 1915, 1916, and 1917.

Name of park.[1]	1914		1915		1916		1917[1]	
	Autos.	Motor-cycles.	Autos.	Motor-cycles.	Autos.	Motor-cycles.	Autos.	Motor-cycles.
Yellowstone[3]	.....	.....	958	.....	3,430	.....	5,285	.....
Sequoia[4]	164	.....	343	11	731	4	923	.....
Yosemite	871	.....	3,901	.....	3,932	.....	5,000	.....
General Grant	409	12	1,604	40	1,730	41	2,091	.....
Mount Rainier	1,597	204	3,235	247	2,973	99	5,792	87
Crater Lake	1,117	18	2,015	31	2,051	29	1,766	15
Mesa Verde	30	4	86	.....	178	2	308	.....
Glacier	267	4	467	16	511	11	1,121	.....
Total	4,455	242	12,609	345	15,536	186	22,286	102

[1] Number of licenses formally reported to Washington, to and including Oct. 10, 1917.
[2] No licenses required for Casa Grande Ruin, Wind Cave, Rocky Mountain, Platt, Hot Springs, Lassen Volcanic, Hawaii, and Sullys Hill National Parks. No roads in Mt. McKinley National Park.
[3] Opened to automobiles Aug. 1, 1915.
[4] License required only for Giant Forest road.

As no licenses are issued for automobile travel in several of the national parks and for the use of unimproved roads in several of the parks where permits are required, this table does not indicate the actual number of cars visiting the park system. The following table, however, gives more complete data on the number of cars entering the parks during the past two seasons:

Private automobiles entering parks during seasons of 1916 and 1917.

Name of park.	1916	1917[1]
Yellowstone	3,445	5,703
Casa Grande Ruin[2]	[4] 470	604
Sequoia[3]	736	2,334
Yosemite	4,043	6,521
General Grant	1,778	2,158
Mount Rainier	3,070	5,894
Crater Lake	2,649	2,756
Wind Cave[2]	[4] 2,500	4,837
Mesa Verde	185	364
Glacier	902	1,121
Rocky Mountain[2]	[4] 10,050	[5] 23,004
Total	29,828	55,296

[1] Automobiles entering parks with or without licenses, to and including Oct. 12, 1917.
[2] No license required.
[3] License required only for Giant Forest road.
[4] Estimated.
[5] 13,807 actually counted from July 1 to Oct. 1; 9,197, conservative estimate of those not counted.

From this latter table of automobile travel it is plainly evident that there has been nearly 100 per cent increase in the number of automobiles in the national parks during the 1917 season. Cars entering the individual national parks more than once have not been counted, but cars that have been driven through more than one park have been counted in each park, of course.

Park-to-park travel.—There was a very large increase in park-to-park travel by motorists during the year. It should also be stated

that many travelers by train took occasion to visit more than one park during the season, and the railroads all heartily encouraged park-to-park travel by their patrons.

Park-to-park highway.—The very large increase in automobile travel to the national parks and monuments and between these reservations makes necessary the early designation of a park-to-park highway connecting all of the parks and monuments. During the past year the National Parks Highway Association accomplished considerable work of importance in this direction. This association had in previous years designated and signed a highway across the plains to Yellowstone National Park, thence to Glacier and Mount Rainier Parks. During the past season this route, which is known as the National Parks Highway, was extended to Crater Lake. The famous Columbia River Highway was officially made a part of the route between Mount Rainier and Crater Lake Parks. The National Park-to-Park Highway Association, with headquarters in Cody, Wyo., which was organized in 1916 to promote a park-to-park highway, has also continued its promotion work. Furthermore, it has devoted much attention to the improvement of the link of the park-to-park highway connecting Denver and Rocky Mountain National Park with Yellowstone Park, by way of the Cody (eastern) gateway.

Roads approaching the national parks were generally in good condition for travel during the 1917 season. In several States, of course, hundreds of miles of paved highway were available for the use of park travelers, while on the other hand there were in some States very poor stretches of road. The road conditions, however, have been improved all through the Western States since last year and the State highway commissions are all busy advancing improvements in their individual territories. Too much emphasis can not be given to the importance of completing the designation of the park-to-park highway and the improvement of same by Federal and State cooperation. When such a road system is completed it will rank as the finest scenic automobile highway in the world.

Appropriations.—Appropriations for the national park system for the fiscal year ending June 30, 1918, total $524,780. Appropriations for 1917 fiscal year were $514,966.67; for the fiscal year ending June 30, 1916, $252,550. Prior to the passage of the sundry civil bill, covering appropriations for the 1917 fiscal year, no funds had ever been provided for the protection and improvement of the national monuments. The 1917 sundry civil bill carried an appropriation of $3,500 for the monuments, and for the 1918 fiscal year $5,000 was appropriated for general purposes of protection and improvement. During the past year special appropriations of $15,000 for road construction in Mukuntuweap National Monument (Zion Canyon),

Utah, and $3,000 for excavation and repair of the ruins of the Navajo National Monument were carried by supply measures other than the sundry civil bill. The recent appropriations for both the national parks and national monuments strikingly indicate the interest of Congress in the improvement of these reservations and the splendid results that have been obtained in the parks and monuments themselves through the expenditure of these funds have tremendously improved conditions for touring therein. Furthermore, the attitude of Congress, as shown by its appropriations for the improvement of the parks and monuments, has encouraged private enterprise to invest capital in the establishment of new hotels, camps, and transportation facilities for the accommodation of visitors in several of the larger national parks.

Revenues.—The revenues of the national parks have materially increased during the past year on account of the very large increase in tourist patronage of the parks and monuments. The revenues for the fiscal year ended June 30, 1917, were $180,571.05, as compared with $177,470.69 for the 1916 fiscal year. The tremendous growth of motor travel in the parks has particularly influenced the increase in revenues. The automobile revenues for 1917, reported prior to October 10, were $87,574, as against $65,833.50 for the entire season of 1916. A clause in the sundry civil bill of June 12, 1917, provides that the revenues of the parks should be covered into the Treasury as miscellaneous receipts on and after July 1, 1918. Under the organic acts establishing most of the parks the department had authority to expend the revenues of these parks in the discretion of the Secretary or his duly authorized representative. Hereafter all the revenues will be subject to appropriation by Congress. It is expected, of course, that a sum equivalent to the revenues turned into the Treasury as miscellaneous receipts will be appropriated each year for park purposes over and above that which Congress would have appropriated if the system still in effect had been retained.

New national park.—Only one new national park, the Mount McKinley National Park, has been established since the date of the last report. This park includes Mount McKinley, the highest mountain in North America—20,300 feet above the level of the sea. The bill creating the park was approved by the President on February 26, 1917 (39 Stats., 938). The area of the new park is approximately 2,200 square miles.

Aside from the scenery of Mount McKinley and other mountains within its boundaries, the park is a natural breeding and feeding ground for great herds of moose, caribou, and mountain sheep. Bear, deer, and many other species of wild animals are also found in the park. As a game sanctuary it ranks second only to Yellowstone National Park, the biggest and finest wild animal refuge in the world.

The sundry civil bill of June 12, 1917, authorized the Secretary of the Interior to accept certain lands in North Carolina, including the Grandfather Mountain, for park purposes. The conveyance of these lands to the Government, however, has not been made as yet, and for this reason the park, which will be the first scenic national park east of the Missisippi River, has not been established.

New national monument.—Verendrye National Monument was established by presidential proclamation of June 29, 1917 (Proclamation No. 1380). This was the only new monument established during the year. This reservation includes Crowhigh Butte, a peculiarly formed eminence on the edge of the Missouri River near Sanish, N. Dak. It was from Crowhigh Butte that the explorer Verendrye first beheld the country beyond the Missouri River. The scenic features of the reservation are almost as important as its historic associations.

The El Morro National Monument was enlarged by the President's proclamation of June 18, 1917 (Proclamation No. 1377), to include several large prehistoric communal houses.

New legislation.—Reference has been made above to the appropriations for the national parks and national monuments and also to the laws establishing the Mount McKinley National Park, and authorizing the acceptance of Grandfather Mountain region for park purposes. The following constitutes the other legislation relating to national parks enacted during the past year:

The act of February 14, 1917 (39 Stats., 994), entitled "An act to add certain lands to Rocky Mountain National Park, Colo.," increased the area of Rocky Mountain Park by 25,265 acres. All of this additional territory lies on the east side of the Rocky Mountains and includes several very beautiful scenic features of the Estes Park region. Among these features are the Twin Sisters Mountain, Gem Lake, and the Needles. This legislation was recommended in the annual reports for 1915 and 1916.

The act of March 2, 1917 (39 Stats., 308), entitled "An act to authorize the sale of certain lands at or near Belton, Mont., for hotel purposes," granted authority to the Secretary of the Interior to sell to the Glacier Park Hotel Co. a tract of land across the Flathead River from Glacier Park near the western gateway. This land is now occupied by the Belton Chalets, and it is understood that ultimately a new hotel will be constructed on this site.

The act of March 3, 1917 (39 Stats., 1122), entitled "An act to authorize an exchange of lands with owners of private holdings within the Glacier National Park," provides for the exchange of timber or timber and lands along the roads in certain scenic sections of the park for timber or timber and lands in other sections of Glacier Park or in the national forests of Montana. Under this act it is

proposed to effect an exchange with the owners of the beautiful timber growth along the Belton-Lake McDonald road, whereby the sylvan beauty of this road may be preserved forever.

Wild animals.—The national parks are all wild animal sanctuaries. Hunting is forbidden and every precaution is taken to protect the wild animals from injury and fright. The results of this conservation policy are becoming more apparent each year. Not only are the wild animals increasing in almost every national park, but they are growing less afraid of visitors and may be seen throughout the tourist season, especially on the trails and footpaths of the parks. There should be State game refuges created near several of the national parks, notably Mount Rainier, Yosemite, and Sequoia National Parks. These refuges would afford protection to the animals of the park when they are driven outside of the park boundaries by heavy snowstorms. At the present time the animals are slaughtered as they leave the park boundaries and are not given the opportunities to propagate that they should have. The establishment of refuges of reasonable size near these parks would impair the sport of hunting for a year or two, but ultimately hunting in these regions would be tremendously improved.

Improvements in the national parks.—The following paragraphs cover a few of the more important features of the development work in the various parks during the past year:

Rocky Mountain National Park.—In Rocky Mountain National Park a winter carnival was held last winter and was enjoyed by several hundred visitors.

Work on the Fall River road by the State of Colorado has progressed favorably, and it is understood that this highway will be completed next year. The State of Colorado agreed to build this road prior to the establishment of the park.

As there is an inhibition on Federal appropriation for this park, limiting the annual appropriation to $10,000, practically no improvement work has been accomplished by the National Park Service. The $10,000 available for this year was sufficient to give the park protection and to repair the telephone lines and a few of the trails. The inhibition mentioned, which is contained in the organic act establishing the park, should be repealed at once in order that necessary Federal improvement of the park may proceed. This park was visited during the year by 117,186 people. It was thus the most popular scenic park of the 1917 season. It is also the most accessible of the large western parks. Its popularity and accessibility alone entitles it to a large measure of consideration by Congress. Bills providing for the removal of the $10,000 inhibition on annual appropriations are pending in both Houses of Congress at the present time, and the

Senate bill, S. 1555, already has been reported favorably by the Public Lands Committee.

Yellowstone National Park.—The reorganization of the concessions in Yellowstone National Park constitutes the most important forward step of the year in the improvement of this park. All the important concessions were reorganized in order that hotel, camp, and transportation facilities might be improved, and also in order that motor-transportation service might be substituted for the horse-drawn stage lines. This adjustment of interests was accomplished early in the year, and concessions were granted to the following:

Yellowstone Park Hotel Co., a concession covering the establishment and operation of the hotel system.

Yellowstone Park Camping Co., organized by the stockholders of the Shaw & Powell and Wylie Camping Cos., the privilege of establishing and operating a system of permanent camps.

Yellowstone Park Transportation Co., the privilege of operating a motor-transportation service through the park from all gateways. This privilege includes the operation of garages, supply stations, etc.

J. E. Haynes, the privilege of selling photographs and pictorial goods of all kinds in the various hotels and camps.

The establishment of the motor-transportation service made possible the inclusion of the scenic Mount Washburn, Dunraven Pass, and Tower Falls regions in the regular park tour. The new service also afforded much longer stopovers at the principal points of interest—Mammoth Hot Springs, Upper Geyser Basin (Old Faithful), Yellowstone Lake, and the Grand Canyon of the Yellowstone.

Cooperation between the motor transportation company and the Chicago, Burlington & Quincy Railroad, reaching the Cody or eastern gateway; the Northern Pacific Railway, touching the park at Gardiner, the northern gateway; and the Union Pacific, the line which makes the Yellowstone or western gateway accessible, made possible, this year, arrangements whereby visitors could enter the park by one gateway and leave in another direction. Heretofore practically all visitors to the park entered and left the park at the same entrance.

A scheduled service to the Jackson Hole, south of Yellowstone Park, was operated from the Lake Hotel this year for the first time. The trip was very popular. The Jackson Hole is one of the most beautiful scenic regions of the United States, and some of this region should be added to Yellowstone National Park. Jackson Lake, the Teton Mountains to and including the Grand Teton, and the headwaters of the Yellowstone River are naturally a part of Yellowstone Park and deserve immediate legal annexation to complete their national park status.

Road improvement in Yellowstone Park is under the direction of the Engineer Corps of the Army and the park itself is controlled by

a military force. This divided responsibility in the management of the park is exceedingly unsatisfactory, particularly to the Department of the Interior, which is charged by law with the "supervision, management, and control" of the national parks. This department does not and can not exercise its legal functions in the park under existing conditions. Yellowstone Park should be protected by a force of civilian rangers, and all road construction and improvement should be accomplished by the trained engineers of the National Park Service. Legislation designed to centralize the administration and control of this park should receive the early consideration of Congress. The National Park Service, under the direction of the department, exercises full powers of supervision, management, and control of all of the national parks with the exception of Yellowstone and Crater Lake. In Crater Lake National Park, however, the War Department is charged with no other duty than the supervision of the road improvement.

Glacier National Park.—Important road and trail improvement work was accomplished in Glacier National Park during the season. Much of the road system on the east side of the park was reconstructed and graveled. Many miles of new tourist trails were constructed. Most of the new trails were built for the use of horses, but several very excellent trails leading from the hotels and chalets were built for the sole use of pedestrians.

Glacier Park had an appreciable increase in tourist travel during the 1917 season. Many visitors of the season, however, had toured the park previously; thus it is clear that the park is becoming a popular tourist resort to which visitors repair year after year. It should also be noted that the average length of time spent by tourists in Glacier Park is longer than in most of the other national parks. Rocky Mountain Park, however, enjoys similar patronage.

The continuation of road-and-trail work in Glacier Park should be authorized, and it is particularly important that a road be constructed along the shore of Lake McDonald and across the Rocky Mountains in the early future. At the present time it is necessary to ship motor cars over the mountains by train, and it is practically impossible for old or infirm visitors to see the park because of the lack of a road across the Continental Divide.

Boating and fishing have been popular sports in Glacier during the season. Fishing has been particularly good.

A tract of patented land on the Flathead River opposite Belton was purchased and donated to the Government by Mr. Mather for use as an administrative site. Headquarters will be removed to this site from their present location on Lake McDonald near Fish Creek.

Mount Rainier National Park.—The Rainier National Park Co. completed and opened the splendid new Paradise Inn in Paradise

Valley late last fall. This new hotel and the camp operated in connection with it were very popular resorts during the past season. The hotel was surrounded with deep snow until the middle of the summer, but the snow sports, including skiing, snowshoeing, sleighing, and tobogganing, that were offered for the enjoyment of the visitor during the early summer, proved to be the sensations of the Mount Rainier season.

Under the $75,000 appropriation all of the roads in the park, including the Storbo road, leading up the White River to Glacier Basin, in the northeastern section of the park, were very greatly improved. Motoring in the park was better than ever before. The next improvement project to be undertaken in this park should be the construction of the Carbon River road to open the beautiful northwestern section of the park to the traveling public.

Crater Lake National Park.—The construction of a broad, new trail on an easy grade from the rim of the crater at the hotel to the shore of Crater Lake was the most important improvement project undertaken in this park. Hereafter it will be possible for the aged and infirm, as well as the young and strong, to reach the surface of the lake and enjoy boating and fishing. It will also be possible to ride to the lake on horseback. The construction of the road around the rim of the crater was continued under the direction of the War Department. This improvement work should be placed under the direction of this department, in order that all development projects in Crater Lake Park may be carried forward by the National Park Service. It would be a very desirable thing to add to this park the scenic Diamond Lake and Mount Thielsen regions, which adjoin the park immediately to the north.

Lassen Volcanic National Park.—Although this park was created on August 9, 1916 (39 Stats., 442), no appropriations have been made for its improvement and protection. Funds for this park should be provided in the early future, in order that it may be opened to the traveling public.

Yosemite National Park.—Improvement in many directions characterizes the administrative effort of the National Park Service in Yosemite National Park. General improvement of the roads and trails was successfully undertaken under a liberal appropriation from Congress and through a wise expenditure of the revenues of the park.

The new power plant, the construction of which was begun last year, is nearly completed. When finished it will have cost $210,000. The plant will generate 2,000 kilowatts and will furnish power for lighting the hotels, camps, roads, and footpaths in Yosemite Valley, and all of the National Park Service buildings, and for cooking and heating in the hotels and camps.

The general concessioner in Yosemite Park, the Desmond Park Service Co., completed the commodious new Glacier Point Hotel and opened it for the tourists' use during the season. The lodges in the high Sierra were also improved during the past season. Considerable new automobile equipment was added to the transportation lines of this concessioner. Altogether, this corporation has expended on improvements in Yosemite Park considerably over a half million dollars during the past 18 months.

The Wawona toll-road system was turned over to the department by the Yosemite Stage & Turnpike Co., and all charges for travel thereover were eliminated except the regular automobile fee.

Sequoia National Park.—Considerable road and trail improvement was undertaken in this park and completed during the season. The Giant Forest road was extended to the Marble Fork River. This road extension opened a very large camping area in a region where fishing is excellent. This road should be continued to the north boundary of the park where it may connect with the road that the county of Tulare is building between General Grant and Sequoia Parks.

The purchase of the private holdings in the Giant Forest were completed in January under the congressional appropriation of $50,000 and the contribution of $20,000 by the National Geographic Society, mentioned in last year's report. These newly acquired holdings were cleared and made available for campers. The water and sanitation systems of the Giant Forest were extended to these lands.

A stairway leading to the top of Moro Rock was erected. From this rock a splendid view of the entire park and the surrounding mountains may be obtained.

The boundaries of Sequoia National Park should be extended to include the Kings and Kern River Canyons, the Great Western Divide, and a large area of the high Sierra, including Mount Whitney, the highest point in the United States exclusive of Alaska. The enactment of legislation providing for this extension of the boundaries of Sequoia Park was recommended in the annual reports of the past two years.

General Grant Park.—The sequoia grove was cleared of underbrush in General Grant Park and the appearance thereof greatly improved.

The water system was extended to new camping areas and shower baths were installed for the convenience of tourists visiting the park next season.

The park enjoyed an increased patronage this year. Hundreds of people camped in the park and many remained therein throughout the summer. This remark also applies to Sequoia Park.

Casa Grande Ruin—Apache Trail.—No appropriations were made for Casa Grande Ruin. It is proper to mention here, however, that the Southern Pacific Railroad Co. has arranged to begin the construction of a new hotel at Roosevelt Dam in connection with the development of its "Apache Trail" trip. Trips to Casa Grande Ruin and several of the monuments in Arizona are being encouraged by the Southern Pacific in connection with the Apache Trail tour. Tourists are carried to Globe or Phoenix, Ariz., by trains of the Southern Pacific and the trip to the Roosevelt Dam, lying between these points, is made by automobile. If the traveler is coming from the East, he leaves his car at Globe and enters it again at Phoenix. If he is coming from the west, the trip is made in the reverse direction, of course.

Mesa Verde Park.—There was very little improvement work accomplished in Mesa Verde Park during the past year. There were no funds available for the excavation of the cliff dwellings or mesa pueblos. A new ranger station is being constructed and the building on the rim of Navajo Canyon, opposite Spruce Tree House, formerly occupied as administrative headquarters, has been converted into a museum and picture gallery for the pleasure and edification of the traveling public.

More funds should be provided immediately by Congress for the excavation and restoration of Peabody House and for further work of excavation at Mummy Lake, where the Far View pueblo was uncovered last year by Dr. Fewkes. Funds also should be provided for the construction of a cut-off road to the top of the mesa in order that the unsatisfactory Point Lookout route now used in ascending the mesa may be abandoned.

Hot Springs Park.—Under authority of the sundry civil bill, not exceeding $10,000 of the revenues of Hot Springs Reservation may be expended in the preparation of comprehensive plans for the improvement of this park. These plans are to include a scheme for its landscape development and studies for a new free bathhouse. Preliminary plans for this development have already been submitted to the department, and they promise a very comprehensive and exceedingly practical scheme for final submission to Congress.

Hot Springs enjoyed an unusually large patronage during the past year. As usual, there was a very large number of indigent sick using the Government free bathhouse. This free bathhouse is old, unsightly, and insanitary, and is a disgrace to the park. The new building to be constructed in connection with the larger development should be erected as soon as possible. An estimate has already been submitted to Congress for the erection and furnishing of this structure.

The free clinic, established in 1916, was continued throughout the past year by public-spirited physicians of Hot Springs Reservation

in connection with the operation of the free Government bathhouse by the National Park Service. The results obtained were very gratifying. Careful record is being made of all cases coming before the free clinic, and the data that have already been accumulated since the establishment of the clinic clearly demonstrate the curative values of the reservation waters in the treatment of several diseases.

The other national parks.—Improvement of the smaller national parks—Platt, Sullys Hill, and Wind Cave—has been carried forward steadily during the past year. Swimming pools were constructed in Platt Park for the use of visitors and road and trail improvement has progressed very satisfactorily.

Better facilities for exploring Wind Cave have been provided, but an efficient lighting system for the cave has not been installed as yet. The game refuge of Wind Cave Park has been developed by the addition of several animals to the herds of elk already ranging therein.

The development of Sullys Hill Park as a wild-animal sanctuary has also advanced satisfactorily during the year.

The biological work in both Wind Cave and Sullys Hill Parks is under the direction of the United States Biological Survey.

Lack of funds has prevented this department from undertaking the administration and improvement of Mount McKinley and Hawaii National Parks. The wild animals of Mount McKinley region are receiving temporary protection at the present time. This protection is afforded by the Governor of Alaska, who has undertaken to detail a member of his limited force of game wardens to range in the Mount McKinley region until Congress appropriates funds for its protection by the National Park Service.

National monuments.—Much important improvement work has been accomplished in the national monuments during the past year.

Under a special appropriation by Congress several miles of new automobile road were constructed in Mukuntuweap National Monument (Zion Canyon), Utah, and a few miles of the old road on the floor of the canyon were improved. The monument was opened to tourist travel early in the season. A concession for the establishment of a camp in the canyon and motor transportation line from Lund, Utah, on the Salt Lake route, to this camp was granted to the National Park Transportation & Camping Co., of which Mr. W. W. Wylie, formerly of Yellowstone Park, is the president. Mukuntuweap National Monument is one of the finest scenic reservations of the park and monument system. The walls of Zion Canyon are nearly as high as those of the Yosemite Valley, and the coloring resembles that of the Grand Canyon of the Colorado River.

Probably more improvement work has been accomplished in Sieur de Monts National Monument than in any other monument, but this work is largely the result of the personal efforts of Custodian George B. Dorr and his associates, who have generously contributed time and

personal funds in the development of this beautiful reservation on the Maine coast. An estimate for appropriations to further the development of this monument has been submitted to Congress for consideration at its next session.

In most of the national monuments containing ruins of prehistoric structures important work of excavation and restoration has been accomplished during the year.

Under a special appropriation of $3,000 some of the ruins of the Navajo National Monument, including the famous Betatakin Ruin, were excavated and repaired through the cooperative efforts of the Smithsonian Institution, Office of Indian Affairs, and the National Park Service.

The Grand Canyon of the Colorado River.—In the annual reports for 1915 and 1916 recommendation was made that the Grand Canyon of the Colorado River (Grand Canyon National Monument, under the Department of Agriculture) should be added to the park system. Senator Ashurst has introduced a bill, No. 390, providing for the establishment of the Grand Canyon National Park, and the early passage of this measure can not be too strongly recommended. The Grand Canyon is now recognized as one of the most sublime scenic regions of the world. It is difficult to conceive of any reason why it should not be dedicated for park purposes immediately. The Department of the Interior and the Agricultural Department have both submitted favorable reports on Senator Ashurst's bill.

Other park projects.—At the present time there are pending in Congress several measures providing for the establishment of new national parks. In addition to the Grand Canyon bill already mentioned, measures providing for the establishment of a national park of the Cliff Cities, in New Mexico, and the Mount Baker National Park, in Washington, have received the consideration of Congress in previous sessions and have had the support of the Interior Department.

New park projects investigated.—During the past year representatives of the Interior Department have investigated and studied the following new park projects:

The proposed Sand Dunes National Park in northern Indiana; the proposed Mississippi Valley National Park on both shores of the Mississippi River between McGregor, Iowa, and Prairie du Chien, Wis.; the proposed Mount Evans or Denver National Park in the Rocky Mountains, considerably west of Denver, Colo.

Urgent needs of the National Park Service.—Among the urgent needs of this new bureau are:

Legislation providing for the repeal of the inhibition on the appropriation of funds for the development of Rocky Mountain National Park;

The centralization of control of the administration, protection, and improvement of Yellowstone National Park in the National Park Service, relieving the War Department of the duty of patrolling the reservation and building and maintaining its roads. Legislation designed to accomplish this result should include the transfer of Crater Lake road improvement to the Park Service;

The addition, by Congress, of part of the Jackson Hole region to Yellowstone National Park;

Extension of the boundaries of Sequoia National Park to include the Kings and Kern River Canyons, the Great Western Divide and several miles of the crest of the Sierra Nevada, including Mount Whitney, as recommended in the annual reports of 1915 and 1916;

Appropriations for the continuation of road and trail improvement of the national park system and for conducting, on a larger scale, the work of informing the American people regarding the scenic, scientific, and historic features of the national parks and monuments;

Reasonable appropriations to enable the National Park Service to assume active administrative control of Mount McKinley, Hawaii, and Lassen Volcanic National Parks, and to protect and improve these parks in a manner contemplated by the organic acts establishing them.

THE TERRITORIES.

Since the transfer under Executive order of July 15, 1909, of the supervision of affairs in Porto Rico to the Insular Bureau of the War Department the former Territories of New Mexico and Arizona have been admitted as States, and there now remains under this department the supervision of but two Territories—Alaska and Hawaii.

ALASKA.

General conditions.—The report of the governor shows that the Territory has had a fairly prosperous year. In some sections there has been a slowing up of development and production, while in others it has been accentuated, war conditions being in all cases the principal cause. The European war, while stimulating copper production to a marked degree, as well as the search for rarer metals demanded by war conditions, has had the effect of retarding gold-lode mining. The greatly increased cost of supplies, including provisions, as well as those materials necessary in the operation of gold-lode mines, has had the effect of discouraging the development of mines of this character. Added to this was a shortage of labor, affecting all kinds of mining operations, both in coastal and interior Alaska. This labor shortage is steadily becoming more acute. Miners, prospectors, and other

workingmen have been lured by the higher wages offered by the copper mining camps in the copper-producing States, where wage scales are much higher than ever before known in the history of copper mining.

A similar condition exists in some of the gold placer areas, especially in interior Alaska, where the richer placers have been exhausted. Low-grade ground can not be mined at a profit under existing circumstances, it is claimed; neither can a fuel supply be procured at a price that will enable mine operators to work their ground at a profit and at the same time pay increased wages with shorter working hours. This has particular reference to the placer mines of the Tanana region, once noted for their richness and prolific yield of alluvial gold. Little can be expected in the way of an increase in the gold product of that section until the problem of cheaper fuel has been solved. The timber that was once contiguous to the placer mines has long since disappeared, and wood (the only available fuel) must now be brought long distances at greatly advanced prices. The opening of the coal deposits on the Nenana River, it is expected, will solve the question, at least in part if not wholly, but until cheaper fuel and cheaper power are available further substantial development of placer and lode mines in the Tenana Valley region can not be expected. The development of lode mines in Alaska so as to become profitable producers demands the investment of large capital, and it is apparent that since the European war began capital has not been seeking investment in gold lode deposits of this Territory. Its attention, however, has been largely directed to the production of copper, which showed a remarkable increase during the year, and the present calendar year will show a still further increase it is expected, notwithstanding the labor shortage and a labor strike in the principal copper-producing district which lasted for some time before being finally adjusted.

While the mining industry has suffered to some extent, the trade and commerce of the Territory in 1916 was the greatest in its history. Mining is but one of the two great industries of Alaska, the other being fishing—the salmon fisheries of Alaska ranking as the most extensive in the world. Considerable expension in the fishing industry is reported, especially during the last half of the fiscal year, which witnessed sharp increases in the prices of all the different species of fish taken in Alaskan waters.

Agriculture.—The development of the agricultural possibilities of Alaska is a matter of gratification to all those who know something of the agricultural capabilities of the Territory. The entrance of the United States as an active factor in the great war has had the effect of stimulating the cultivation of land suitable for agricultural purposes and the production of agricultural products, especially potatoes and many varieties of hardy vegetables. The potato yield of central

Alaska the present year, it is expected, will be sufficient to supply local consumption and also the demands of northwestern Alaska. This is a distinct departure, for until within the last year or two the great bulk of this tuber required for consumption in Alaska was imported from the States.

The governor states that the Territory still suffers from too much reservation rather than conservation of its natural resources. With potentially great and valuable deposits of coal, little coal has as yet been produced commercially; with promising oil regions almost wholly undeveloped and placed by reservation beyond control other than that exercised by the Federal Government, Alaska oil and its products, so badly needed not only in Alaska but throughout the Nation, are practically of no more use to the people than if the oil lands were located at the North Pole. The commercial development of the Territory, however, has made substantial strides during the year; trade with the United States was the greatest in its history, and, notwithstanding the decrease in mining along some lines, there is no reason to believe that the steady development which the past four years have witnessed will not continue indefinitely. However, the uncertainties of the present time and the unusual conditions that have arisen during the past three years, coupled with the waiting attitude of capital, must in the very nature of things result in delaying that widespread development of the Territory's natural resources which otherwise would have resulted in greatly accelerated industrial progress.

Population.—One of the insistent needs of the Territory is a greatly increased population—one that will be attached to the soil, so to speak. While the greater proportion of the population of Alaska is undoubtedly permanent, there is on the other hand a floating population attracted by the opportunities that are considered better than elsewhere. The Argonaut fared forth to explore new lands and to make a stake, then returned to his former domicile. Many, however, remained and became founders of new States and the builders of towns and cities, and history of that kind is repeating itself in Alaska. A permanent population has been established, though the process has been slow. Alaska's white population to-day probably is not much in excess of 50,000—a mere handful of people, when the size of the Territory and the vast and varied natural resources are taken into consideration. The Scandinavian Peninsula supports a population of 10,000,000 or more; its natural resources are in no way comparable with those of Alaska. Climatic conditions are similar, but Norway, Sweden, and Denmark, as well as Finland, were old countries when the North American Continent was not even a dream. The statement that the people of Alaska have borne more handicaps than any other people who have pioneered new, undeveloped territory, at least on the North American Conti-

nent, has been so often made that it has become trite. Nevertheless it is true. If the best portions of the Far West had been reserved; if the pioneers had been forbidden to make use of those natural resources which they found at hand and penalized if they attempted to use them, is it reasonable to suppose that the Middle West and the Far West would have produced many great commonwealths within a comparatively short time?

Conservation, which is defined as the act of preserving, maintaining, supporting, or protecting, is no doubt sound in principle; but conservation as applied to Alaska, while it has preserved coal, oil, and timber, has largely estopped development along these lines. The coal lands of Alaska were reserved by Executive order in 1906 and the oil lands some years later, and there has been no general development of either coal or oil resources. Coal is mined to-day only on a small scale and oil development is at a standstill. The need of coal, such as is found in Alaska, is apparent all over the Pacific coast. Yet the production is limited and confined to but one section of the Territory. The same is true of oil. There is no doubt that the coal areas of Alaska are capable of supplying sufficient quantities of coal for all domestic and industrial purposes of the Pacific coast regions were they developed commercially, and if the oil lands of the Territory could be properly developed, they would largely add to the supply of gasoline.

The governor states that the Territory possesses within its borders a number of the finest water powers to be found on the Pacific coast, only a few of which have ever been utilized in any way. There are billions of feet of timber suitable only for wood-pulp purposes, yet neither the pulp timber nor the unharnessed water power may be used because existing laws are either inadequate or are such as will not permit the investment of the necessary capital required for development and manufacturing purposes. All the possible electric energy that can be developed is situated on lands belonging to the United States. The agitation of some years ago, in favor of conservation of natural resources resulted in restrictions so severe that Alaska's resources, such as coal, oil, and water powers, were not only preserved but reserved, and existing laws are such that the utilization of these sites for hydroelectric plants is virtually impossible. Capital is scared away immediately upon learning that these water powers can only be developed by obtaining a permit, revocable at the pleasure of a Federal department or bureau. The plain result is that capital looks askance when the subject of the development of these water powers for industrial purposes is broached. Determined efforts have been made to induce Congress to pass a law which would offer opportunities for capital to develop water powers located on public lands under Federal control. Although one bill passed

the Senate and another passed the House, the legislation necessary is still to be enacted. The governor calls attention to Senate bill No. 2812, introduced at the recent special session of Congress by Senator Walsh, of Montana, the provisions of which, he states, are such as should encourage development, safeguard capital, and at the same time adequately protect the public interest, and expresses the hope that it will be speedily enacted into law.

Alaska natives.—Economic conditions among the natives of Alaska have changed considerably during the past year. Those depending upon furs for their main livelihood have not only faced a scarcity of pelts but have found that prices were below normal on account of the war. On the other hand, the cost of food and other supplies which have to be shipped from the States has increased from 50 to 300 per cent. Added to this, in a great many sections there has also been a scarcity of fish during the year, which has reduced their winter supply of this food article. To combat these conditions instructions were issued urging the natives to live as much as possible independently of imported food supplies and manufactured articles, and to conserve the native products not only for their own sustenance, but for the assistance they thereby render the country in the war in which it is engaged. Therefore the native, as a farmer, is gradually becoming a factor in the development of the Territory. Through its schools in Alaska, the United States Bureau of Education is attempting to teach the natives the advantages of having their own gardens in which to raise their own foodstuffs not only for their own use but for the use of miners and others. Under the present law it is possible for natives to acquire allotments of lands in Alaska. To date their usefulness has been rather doubtful. The allotments as now made are really too small for hunting purposes and too large for farms. The native has not yet reached the stage where he can handle intelligently a 160-acre farm.

The natives continue to avail themselves of the Alaska legislative provision of 1915 for citizenship; and several villages have been organized in accordance with the act passed by the same legislature. Up to the present most of these have been in southeastern Alaska, where the natives appear to be the most progressive. When a village is properly organized, a council manages its affairs in a creditable manner, and improved conditions are always the result of such management. The fact that the Alaska natives are not a dependent people can not be overemphasized in order to give them the credit they deserve for successfully fighting for an existence in the face of rapidly changing conditions, caused by coming into contact with the white man. Although the native has had to rearrange his mode of living and, to a certain extent, his method of securing a livelihood, he has rarely been forced to ask for aid. Only $2,000 was expended for the

relief of destitution during the past year. This is 8 cents per capita, based on a native population of 25,000. In most cases the relief was given only on account of temporary destitution. In such sections of Alaska where reindeer have been distributed the native's economic independence has already been established.

However, such sections are restricted to the coastal regions, western and northwestern Alaska. Given the means to properly guide the natives in their acquisition of civilization, there should be little difficulty in transforming them into self-reliant and useful citizens. They are unquestionably an asset to Alaska, and their development is of paramount importance to the best interests of the Territory. The success of the cooperative stores already established in nine villages, without the aid of Government funds, demonstrates what can be done along this line under proper supervision. Two of these native store companies not only do a general mercantile business, but manage sawmills which produce lumber for their own communities and for neighboring towns as well. The establishment of larger villages has been encouraged. This end is secured by a policy of setting aside selected tracts through Executive orders for the use of natives exclusively and the establishment thereon of suitable and attractive industries. This policy at present is in its infancy, but sufficient progress has been made to clearly demonstrate its feasibility in parts of Alaska.

It is necessary that the medical needs of the natives be carefully looked after. Trachoma, tuberculosis and venereal diseases are the most common of their afflictions and must be combated energetically to save the natives from extermination.

Native school service.—Seventy schools, of which two were summer schools only, were maintained by the United States Bureau of Education during the past year. The total enrollment was 3,600. Most of these schools included the elementary grades only, presided over by one of the teachers. In some of the larger villages more advanced work, up to the eighth or ninth grade, was done, as at Metlakahtla, Hydaburg, Unalakleet, Wales, and Barrow, where from three to six teachers were employed. Quite often the teachers are the only white people in the native communities, and the natives, therefore, naturally look to them for guidance, counsel, and assistance in matters concerning their welfare. Each school is also provided with a well-selected assortment of medicines with which to alleviate the minor ailments and sufferings of the people. School fairs have been established and have been very successful. The industrial work, which is of great importance to the natives, is gradually being developed. Agriculture is being developed through school gardens, and these may be found in almost every section of Alaska, and through this agency not only the interest of the younger generation is being stimulated, but that of the entire village.

Affairs at Metlakahtla assumed a somewhat more definite shape during the year. The legality of the fishery reserve having been reaffirmed by the Circuit Court of Appeals, definite plans for the development of this interesting colony are now being formulated. The cannery and fishing privileges of Annette Island, on which Metlakahtla is located, have been leased, and the cannery which was burned last year is to be rebuilt for use during the season of 1918. A native company is now doing a general mercantile business and managing a sawmill. A continued growth will place it on a firm financial basis and will enable it to take over the cannery at the expiration of the present lease. Through the means thus afforded, the economic restoration of the colony is assured, not only in the final possession of the cooperative cannery, but a definite income is thus assured the inhabitants during the successive years.

At the present many native children are sent to the States to attend the Cushman and Chemawa schools, under the Office of Indian Affairs, for advanced training as well as elementary education. This course has proved very disastrous, as the change in climate usually impairs their health to such an extent that tuberculosis is contracted, after which the decline is rapid and the complete change in environment has a fatal effect upon the pupils' future usefulness. It is therefore urged that the training schools for these native people be located in Alaska under conditions similar to their previous environments, where health will not be impaired, but rather improved on account of supervision and where only such practical subjects will be taught as will be useful to them in the future.

The insistent needs of this service are more schools, a reimbursable fund with which to establish industrial enterprises among the natives as an insurance for economic independence, a power schooner for use as a freighter and training ship, and an industrial school in southeastern Alaska for advanced pupils.

The Alaska native medical service is under the Bureau of Education, with the advice and cooperation of the United States Public Health Service. The appropriation for this work for the past year was $50,000, which was $25,000 more than the first appropriation ever made for medical relief among the natives, granted the previous year. A well-equipped and complete hospital is maintained in Juneau and small hospitals are also maintained at Kanakanak, on Bristol Bay, and Nulato, on the Yukon, each of which is in charge of a physician and one nurse. An effective medical service should be organized and sustained.

Alaska reindeer service.—A conservative estimate of the total number of reindeer in Alaska is 95,000; this large number is the result of the introduction in 1892 of 1,280 reindeer from Siberia. The statistics for the year ended June 30, 1916, show a total of 82,151 reindeer

distributed among 85 herds. Of this number 56,045, or 58 per cent, were owned by 1,293 natives; 3,390, or 4 per cent, by the United States; 5,186, or 6 per cent, by missions; and 17,530, or 22 per cent, by Laplanders and other whites. That this industry is of paramount importance to the natives is recognized in the fact that the incomes of the natives from this industry, exclusive of meats and hides used by themselves, amounted to $91,430. The distribution of the deer has now been firmly established and the natives thereby are assured of a livelihood that is usually limited only by their individual energy. Reindeer fairs are held annually during the winter season in different sections of northwestern Alaska.

The present needs of this service are an increased appropriation for the purpose of employing two specialists whose duty will be to introduce methods for improvement of breeding and scientific handling of the deer; to investigate reindeer diseases and establish means of combating them, and to give special attention to all matters pertaining to the improvement of the industry.

Fisheries.—Of the natural resources of Alaska, the fisheries stand next in importance to the mineral wealth, the yield of fishery products being of the value of $27,000,000 or more a year. For many years after Alaska became an American possession, the fisheries, although undeveloped to anything like their present importance, far exceeded the mineral values; later, for a period of several years, the mineral and fisheries outputs were approximately of equal value, and in the last two years, with the great increase in the production of copper, the value of the annual output of minerals is considerably in excess of that of fisheries. It is noteworthy, however, that since Alaska was purchased in 1867, the total value of fisheries, including aquatic furs, is only $4,000,000 less than the value of the mineral products. Unlike certain other industries—copper mining, for intance—the business need not be carried on at the expense of the future in any degree whatever. With mining, each year's output decreases by exactly that amount the wealth which will ever be available. With the fisheries, a year's output does not necessarily reduce the supply of future years at all, provided that due steps are taken for their conservation and the laws are efficiently enforced.

The waters teem with herring and cod, and it is undoubtedly possible to develop these fisheries much beyond their present state. Particularly is this true of the herring fishery. The salmon fishery is the most important to Alaska, the halibut fishery is next in value, while cod, herring, and whale fisheries represent other important phases of the industry. The clam-canning industry has recently developed to considerable extent in the central district of Alaska. This industry can be carried on all year around and gives promise of considerable extension, there being now some four or five canneries in

actual operation. Another recent innovation in fishery development work is the utilization of shark skins for the manufacture of leather. The introduction of the Scotch-cure method of preparing herring will also be of great benefit to the Territory; this work was taken up for the first time in 1917. In 1916 there were employed in the fisheries of Alaska 23,994 persons, of whom 12,449 were whites, 4,793 natives, 1,831 Japanese, 2,371 Chinese, and 2,550 miscellaneous, consisting of Filipinos, Mexicans, Negroes, Porto Ricans, etc. In 1915 the grand total was 22,462, or 1,532 less than in 1916. In 1916 the investments in the fisheries of Alaska amounted to $39,569,612, an increase of $2,253,052 over 1915. The investment in the salmon-canning industry alone amounted to $34,100,853, approximately 86 per cent of the total. Other industries in which the investment exceeded a million dollars were the halibut industry, $2,149,311, and the whale fishery, $1,091,471. Of the total investment in 1916, about $16,500,000 was in southeast Alaska, $7,130,000 in central Alaska, and $15,930,000 in western Alaska. In 1916 the value of the products of Alaska fisheries, exclusive of aquatic furs, was $26,156,559, which exceeded the corresponding figure for 1915 by $5,187,216. In both quantity and value the output of the fisheries of Alaska was greater than in any previous year.

Territorial fish commission.—The Alaska legislature, session of 1917, enacted a law providing for the construction of fish hatcheries and for the protection and care of natural spawning grounds in the Territory and the creation of a board of fish commissioners. The law appropriates $80,000 from the Territorial treasury for the purpose mentioned.

Fur-bearing animals.—The food requirements of the native inhabitants of the Pribilof Islands determined the number of fur seals to be killed there in the calendar year 1916, which totaled 6,468. The number of fur-seal skins shipped from the Pribilof Islands in 1916 was 706. On September 20, 1916, there were sold at St. Louis more than 1,900 fur-seal skins from the Pribilof Islands after being dressed, dyed, and machined at the new sealskin dying plant in that city. These skins brought $74,530, or an average of $45.69 per skin. The sale of September 20 was the first of the Pribilof Island sealskins since December 16, 1913, the skins on hand having been withheld from sale on account of unfavorable market conditions. The census of the fur-seal herd, taken in 1916, showed a total of 417,281 members. Fox farming continues to receive consideration, and it is hoped that the business is becoming established from year to year on a better basis. The total shipment of furs of all kinds from Alaska during the fiscal year amounted to $1,143,601.35.

Mineral production.—Besides producing copper, gold, and silver in large quantities, Alaska has many of the rarer minerals, though

largely undeveloped, such as antimony, tungsten, tin, lead, petroleum, platinum, chromite, nickel and cobalt, quicksilver, molybdenite and bismuth, iron, and other minerals, including gypsum, graphite, and sulphur. The Territory's mineral production for the calendar year 1916 was the greatest in its history, amounting to $50,900,000, as compared with $32,850,000 in 1915. The increase in 1916 was over 54 per cent, this being due to the greatly increased copper production, which amounted to 120,850,000 pounds, valued at $32,400,000. There was also a small increase in the gold output, which in 1916 was $17,050,000 and in 1915 $16,700,000. In 1916 of the gold produced, $10,640,000 was from placer mines; silver, lead, tin, antimony, tungsten, marble, gypsum, and coal was produced to the value of $1,300,000. During 32 years of mining Alaska has produced $351,000,000 in gold, silver, copper, and other minerals, or nearly 50 times the price paid Russia for the Territory. Of this amount $278,000,000 represents the value of the gold, and $68,000,000 that of the copper.

National forests of Alaska.—The total receipts of the Tongass and Chugach National Forests during the fiscal year ended June 30, 1917, were $66,718.46, and the total cost of administering the two forests for the same period was $45,770.30. The total number of applications received for homesteads on the Tongass National Forest, under the act of June 11, 1906, is 220; of this number 47 were received during the last fiscal year. The total number of applications for homesteads on the Chugach National Forest is 393, of which 78 were received during the last fiscal year. The total number of acres listed as agricultural on the Tongass National Forest is 5,519, of which 1,570 were listed during the last fiscal year. The total number of acres listed on the Chugach National Forest is 23,914, of which 12,457 were listed during the last fiscal year.

The Forest Service, in cooperating with the Geological Survey, is continuing and increasing its investigations of water power in southeastern Alaska, which were begun in June, 1916.

General development along the line of the Government railroad.—Work on the Government railroad is reported to be progressing satisfactorily. The Alaska Northern Railroad, which has been purchased and made a part of the Government project, and which runs from Seward to Kern Creek, a distance of 71 miles, is being rehabilitated. The road has been completed from Anchorage southward for 22 miles, and northward to Montana Creek, with a branch to Chickaloon, the heart of the Matanuska coal field, a total of 155 miles. The work is also being pushed southward from Nenana toward the Nenana coal field, about 10 miles of rail having been laid here. Grading and clearing is being done on other portions, namely, north of Montana Creek and toward Broad Pass, and north of Nenana toward Fairbanks.

The Tanana Valley Railroad, a narrow-gauge road leading from Fairbanks to Chatanika, a distance of 39 miles, is now being operated by the Government under lease, and it is planned to purchase this road and operate it as a part of the Government project.

At Seward the Government has erected an excellent wharf and many improvements have been made along the water front. A large fishing industry has been located here. The Navy Department is now installing a large wireless plant within a short distance of the town.

The town of Anchorage is prospering and many improvements are under way. It now has a population of from 5,000 to 6,000. The Alaskan Engineering Commission has added somewhat to its facilities at this point.

North of the Matanuska River is what is known as the Matanuska Valley. Much clearing has been done here and many prosperous little farms are under cultivation. It is believed that considerable development will be seen in this region in the near future.

A small town site has been laid out at Wasilla, a point about 9 miles north of Matanuska Junction, in the center of a large farming section. This is the nearest point to the Willow Creek mines.

Matanuska, a small town, has been laid out at the junction of the main line of the railroad, with a branch leading to the Matanuska coal field. Its population now numbers several hundred people. The Government has started an agricultural experiment station within a short distance of Matanuska Junction, and it is expected that this will be a large aid to the farmers.

The town of Nenana is situated adjacent to the crossing of the Tanana River by the railroad line and shows signs of prosperity. The Alaskan Engineering Commission has built an excellent wharf, various warehouses, etc., an electric-light system has been installed, and water and sewer systems are being constructed. At both Anchorage and Nenana the commission maintains excellent hospitals. Here its employees are treated by the Government. At Seward arrangements have been made with the general hospital where adequate service is given. Owing to the absence of other hospital facilities at Anchorage and Nenana, outside cases have been treated at the Government hospital at reasonable rates.

In the vicinity of Fairbanks there is considerable agricultural development. There are many farms under cultivation, and the products raised are of the most excellent quality. The placer-mining work in this district at present is at low ebb owing to the great scarcity of fuel and exceedingly high prices of supplies and materials. When the railroad is connected with the Nenana coal fields it is believed that cheap coal can be provided for the working of these mines, the Tanana Valley Railroad being used as a valuable feeder of the Government railroad in this respect.

The Alaska fund.—The revenues derived by the Federal Government from business and trade licenses outside of incorporated towns during the fiscal year amounted to $259,370.44, as compared with $249,432.39 for the fiscal year 1916. The total amount of revenues received on account of taxes levied by the Government within the incorporated towns in the form of business and trade licenses was $172,986.82, as compared with $166,475.98 the previous year.

The Alaska insane.—The insane of Alaska have always been cared for outside of the Territory under the contract system. The present contractor is The Sanitarium Co., of Portland, Oreg. The increase in the number of insane persons in Alaska has been gradual and in keeping with the growth of the population of the Territory, and, therefore, there has been a gradual expansion of the sanitarium plant in order to furnish the necessary accommodations for the patients confined therein. During the past four years substantial improvements have been made to the sanitarium. The number of Alaskan insane under treatment on June 30, 1917, was 211, of whom 184 were males and 27 females, as compared with 165 males and 23 females on the same date last year. Detention hospitals for the temporary care of the insane of Alaska are located at Fairbanks and Nome.

Aids to navigation.—The Department of Commerce, through the Lighthouse Service, continued its work in providing additional aids and safeguards to navigation along the Alaska coast during the fiscal year. Eleven lights were added to the existing number, as compared with 35 during the previous year. One fog-signal station was established and one improved; 6 gas buoys and 17 other buoys were constructed and placed in position and 7 beacons were established during the year.

Roads and trails.—The importance of roads and trails, especially in the development of a new country, can not be overestimated. Alaska is a difficult country in which to construct roads, costs of construction are heavy, and, in consequence, the Territory has but a small mileage of really good roads. The cost of maintaining the roads and trails that have been constructed leaves but a small amount of money for new work each year or the development of road building on a comprehensive scale, such as is required by the settlement of the Territory and its constantly increasing needs. The Government railroad will need roads and trails as feeders, and the farming districts now being opened up will require more and more road mileage with each succeeding year. In addition to the appropriation by Congress and the amount received from the Alaska fund, the Territorial legislature, session of 1917, appropriated $400,000 for road and trail building purposes, to cover two years' expenditures, each of the four judicial divisions to receive $100,000. The amount appropriated by Congress for the fiscal year 1917 was $576,747.90, of which $76,716.15 was received from the Alaska fund.

Experiment stations.—The work at the Government experiment stations progressed favorably during the past year. Grain growing and the hybridization of grain, with a view to developing new varieties, has become the most important work at the Rampart station. This year there were upward of 200 plats, large and small, devoted to tests of various varieties of grain. The Fairbanks station was operated as a demonstration farm the past season. There were about 100 acres in grain at this station, most of which matured, though some of the late oats were cut for hay. The Kodiak station has been devoted to stock breeding exclusively, as heretofore. The native pastures, which suffered severely by the Katmai volcanic ash deposits in 1912, have practically been reestablished, and the cattle and sheep are doing well. A station was started in the Matanuska Valley the past spring. A reservation of 880 acres has been made for this station near the little town of Matanuska, and the pioneer steps of erecting the necessary buildings and clearing sufficient land to begin culture are under way.

Labor conditions.—The Territory is suffering from a shortage of labor in nearly every section, and in some it became pronounced during the past spring and summer. This is especially true of southeastern Alaska, where the great, low-grade lode mines are severely handicapped in their operations by reason of a lack of sufficient labor to conduct these enterprises. As a result, gold production has been curtailed to a considerable extent. A strike of miners employed by the Kennecott Copper Corporation, in the Copper River Basin, occurred in June of this year. The strike, however, was not of long duration. There was also a labor strike on the part of some men employed in the construction of the Government railroad at Nenana, but the differences were satisfactorily and speedily adjusted.

A general eight-hour law, applicable to all wage and salary earners in the Territory, will become effective on January 1, 1918. The law was passed by the Alaska legislature, session of 1917.

Health conditions.—Alaska is a healthful country; malaria is unknown, and epidemical diseases, except occasionally among the native population, are rare, and such as occur are due to passenger travel from the ports of the Pacific coast States. Health conditions among the natives of Alaska are steadily improving, due to hygienic and sanitary campaigns that are waged by the teachers of the Bureau of Education, and through the work of the missionaries and of the health commissioners of the Territory. Relief for such persons as may become incapacitated for labor, through sickness or accident, is provided by both the Federal and Territorial Governments, the former aid being extended by the operation of an act of Congress which provides that 10 per cent of the Alaska fund, or so much

thereof as may be necessary, shall be appropriated for their relief by the judges of the different judicial divisions. The Territorial relief is provided by an appropriation made from the Territorial treasury and is expended under the direction of the governor.

Alaska game laws.—The game of Alaska is under the dual control of the Department of Agriculture and the office of the governor, the latter being also charged with the execution of the law. The Department of Commerce exercises control over the fish and the marine and terrestrial fur-bearing animals. While the authority to enforce the game laws is vested in the governor, who appoints game wardens and guides, the Secretary of Agriculture provides regulations thereunder. The protection afforded the game animals of Alaska is having more or less satisfactory results, but with the settlement of the Territory it is probable that game will steadily decrease unless a more drastic law is enacted and provision made for a largely increased number of wardens. The sum annually appropriated by Congress for the protection of game is $20,000.

Public buildings.—Juneau, the capital of the Territory, has no Federal building, although the need of such becomes more pressing every year with the development of the Territory and the growth of the business of the Government. Besides the governor's office, which is located in an inferior building once used as a native mission school and which also serves as the home for the valuable books, archives, etc., of the Alaska Historical Library and Museum, there are rented quarters for the post office, United States land office, the surveyor general's office, the customs office, the board of steamboat inspectors, the field offices of the Department of the Interior, the Alaska Road Commission, and the United States Weather Bureau.

Territorial banks.—Alaska has 16 Territorial banks and 3 national banks, an increase during the year of 2 Territorial banking institutions. New banks were established at Cordova and Fairbanks during the year, and there was one failure. The combined capital of the Territorial banks is $700,000; the total surplus and undivided profits amounted to $231,728.16, and the deposits, on August 7, were $6,544,489.62.

Assessed valuation and taxes.—There are 16 incorporated towns in the Territory. The town of Juneau has a bonded indebtedness of $75,000, under a special act of Congress, incurred in the construction of a new school building which was completed early in September, 1917. Reports received from the 12 incorporated towns which caused an assessment of property to be made in 1916 show a total assessed value of $14,479,049. There is no assessment of real or personal property outside of incorporated towns, except in the case of incorporated school districts outside of incorporated towns, which, under a territorial law, are given the power to levy taxes for the

support of schools. The Territory raises its revenues largely from business and trade licenses and a tax upon the output of salmon canneries.

Commerce.—The rapid development of Alaska along commercial lines during the fiscal year is well illustrated by the greatly increased growth of commerce, which reached the high-water mark in the history of the Territory, exceeding in value that of 1916 by the substantial sum of $23,925,527. The volume of merchandise shipments, including precious metals and copper between Alaska and the United States and between the Territory and foreign countries, for the fiscal year 1917 amounted to $121,265,947, as compared with $97,340,420 for the fiscal year 1916.

Public schools.—The school system has been a matter of slow but steady development, and the support and encouragement given it has had both a stimulating and sustaining effect. By an act of Congress approved March 3, 1917, the control of the white schools of Alaska was transferred to the Territory, and the legislature at the session of 1917 enacted a series of laws relating to schools and amending the Federal school law. Substantial appropriations for the maintenance of the white schools were also made by the legislature, to supplement the moneys received for school purposes through the school section of the Alaska fund. During the year 1916–17 schools were maintained in 40 districts outside of incorporated towns. These schools employed 50 teachers and had an enrollment of 1,364 pupils. Nine districts were organized during the year, making a total of 49 school districts at the beginning of the school year 1917–18. Graded schools are maintained in 15 of the 16 incorporated towns of the Territory. Reports received from 13 of the 15 incorporated town schools for the year 1916–17 show a total of 68 teachers employed, a total enrollment of 1,778, including high school students, and a total daily average attendance of 1,397. The average number of pupils enrolled per school was 120.8; the average cost of maintenance per school was $10,510.15.

Liquor traffic among the natives.—Four special employees for the suppression of the liquor traffic among the natives of Alaska were engaged in the work during the year with marked success. The natives are learning that intoxicating liquors are their worst enemy and there are many among them who are earnest workers in the temperance cause. With a prohibitory liquor law going into effect January 1, 1918, it may be reasonably expected that there will be a still further decrease in the liquor traffic among the natives, but it must not be expected that the traffic will have ceased, for no doubt considerable quantities will still remain in the Territory even after its sale has been absolutely penalized, and also it may be expected that it will be smuggled into the Territory to some extent. Added to this

there will, without doubt, be an increase in the illicit manufacture of liquors, which during the past four years has practically disappeared except in extremely remote localities.

Coal-mine development.—The development of coal mines in the Matanuska region and in the Bering River field continued during the year, the output from the coal mines of the Matanuska district going largely to the Alaskan Engineering Commission at Anchorage for use in its locomotives, etc., and for domestic purposes at Anchorage and other construction points on the railroad. The Eska Creek mine was taken over by the Government during the past summer from the operators, upon payment of a stipulated sum, and is now being opened up in a comprehensive manner. The work of developing mines in the Chickaloon section was also begun during the summer. A coal mine is also being developed in the Bering River field, and a railroad to carry the product to tidewater on Controller Bay is also being constructed.

The governor's office.—The governor calls attention to the fact that the volume of business transacted in his office has increased enormously during the past four years. A part of this increase is due to the inauguration of a Territorial form of government in 1912, with an elective legislature and the consequent creation of a number of Territorial departments, boards, etc., which are charged with a variety of duties under Territorial laws. There has also been a large increase of strictly Federal business, as distinguished from Territorial, due to the growth of population and the development of the country along industrial and commercial lines.

The Territorial legislature.—The third Alaska legislature convened in March, 1917. Among the important and constructive legislation enacted was the following: A direct primary law; a law providing for the election of national committeemen of the different political parties and of delegates to national conventions; a law providing for the establishment of the first institution of higher learning in the Territory, the Alaska Agricultural College and School of Mines, to be located at Fairbanks. A law was also enacted designating the agricultural college and school of mines as the beneficiary of grants of land authorized by the act of Congress approved March 4, 1915, and of moneys for the benefit of State and Territorial colleges of agriculture and mechanic arts, authorized by acts of Congress approved August 30, 1890, and March 4, 1907; an act appropriating $100,000 for the defense of the Territory, to be expended under the direction of the governor; an act making an appropriation for the detection of crime; an act providing for military defense and for other purposes; an act amending the Territorial banking laws; an act grating money allowances to mothers of dependent children; an act amending the vital-statistics law and providing

for the issue of marriage licenses before marriage can be solemnized; an act prohibiting the sale or gift of cigarettes, cigars, or tobacco in any form to minors under 18 years; an act to establish night schools to fit adult uneducated aliens for citizenship; an act for the incorporation of cooperative associations; an act providing for fish hatcheries and for the protection and care of natural spawning grounds and the creation of a board of fish commissioners, and making an appropriation of $80,000 for the purposes of the act; an act providing for the leasing of school lands; an act providing for the rescue of lost persons; an act providing for a Territorial board of road commissioners and appropriating $400,000 for road and trail construction; an act authorizing the incorporation of school districts outside of incorporated towns and providing for a tax levy for the support of such schools; an act to provide for the maintenance of public schools and high schools in incorporated towns, cities, and incorporated school districts, 75 per cent of such cost of maintenance to be paid from the Territorial treasury; an act to establish a uniform school system in the Territory and creating a Territorial board of education and the office of commissioner of education (native schools are not included in the above act); an act for the preservation of public peace and safety in time of war and prevention of sedition and the exciting of ill feeling against the Government and for the prevention of the exhibition of disrespect or contempt for the Government of the United States or for the flag or President or for certain officers thereof.

HAWAII.

The governor of Hawaii, in his annual report, states that the Territory has enjoyed unusual prosperity during the year. Of the two staple products of the Territory, sugar exported for the year totaled 581,318 tons, valued at $62,743,372, and pineapples, valued at $8,933,056, or a total for these two products of $71,676,428 as against a value last year of $63,299,290. Agricultural products remained practically as in 1916. The importation of foodstuffs for human consumption was $10,419,371, an increase of $2,606,012.

The assessable property totaled $231,920,919 as of January 1, 1917, against $206,970,229 for the same period in 1916, an increase of $24,950,690. The bonded debt of the Territory decreased $150,000 during the year and now stands at $7,874,000, the legal limit of the Territorial indebtedness being $16,234,464. The total commercial bank deposits as of December 31, 1916, were $22,486,524.31, and savings bank deposits as of June 30, 1917, were $10,205,496.70, both aggregating $32,692,021.01 as against $26,379,249.68, showing an increase of $6,312,771.33.

The volume of business transacted by the Territorial Marketing Division during the year was greater than for any previous year in its history. The consignments handled included nearly every island agricultural product from green vegetables and preserved fruit products to dressed meat and live stock; individual consignments numbered 2,538 and were sold for a total of $121,512.90. In addition to the consignments, sales of seeds, crates, and merchandise to the amount of $18,006.15 were made to producers and others. Retail meat and vegetable branches were established to furnish an outlet for consigned produce, which could not be sold to advantage to local retail stores. These branches were operated practically at cost and have served a most useful purpose to the purchasing public.

Liberal appropriations were made at the recent session of the legislature for extension work among producers, so as to advise them as to what and when to plant and how best to prepare and grade for shipment to market. A special fund of $2,500 was also provided to permit of the purchase of vegetable and other food-crop seed for sale at cost plus actual selling expenses.

This Division is placed under the supervision of the Board of Commissioners of Agriculture and Forestry of the Territory.

There were no business failures of any moment and no friction between laborers and the plantation interests reported.

The progress of the Territory is peculiarly dependent upon the development of transportation facilities, due to the fact that it is situated in the mid-Pacific, subdivided into a number of islands, and compelled to look to the continental United States as a market for its products, and also a supply depot for its needs. The tourist business, however, is yearly showing a large increase, and as a consequence closer attention is being paid to this phase of transportation. The mild and agreeable climate, the striking scenery, and natural phenomena are calculated to make Hawaii a permanent resort for tourists and seasonal residents.

Through the setting aside by act of Congress, approved August 1, 1916, of certain lands embracing the celebrated volcanoes of Kilauea, Mauna Loa, and Haleakala, to be known as the Hawaii National Park, Hawaii is provided with permanent attractions for tourists and travelers unequaled anywhere in the world. The lands set aside are gradually being acquired by deeds and exchanges. B. G. Rivenburgh, commissioner of public lands for the Territory, has been designated to act in behalf of the National Park Service. He is making the necessary arrangements that will bring to ultimate consummation the plans of the people for a national park in Hawaii. The strongest local support will be given the Federal Government in these projects.

Imports and exports.—The imports aggregated $46,358,341, as against $34,098,210 for 1916. The import of foodstuffs for human

consumption was $10,419,371, as against $7,813,359 for 1916, made up of provisions, $381,065; breadstuffs, $1,303,628; vegetables, $216,980; sundry articles, $704,339. War prices and depleted stocks account for these increases.

The exports aggregated $75,115,983, as against $64,670,852 for 1916. These were made up of sugar, raw and refined; coffee, raw; fruits and nuts; rice; hides; bananas, etc.

The following table shows imports and exports by countries for 1916 and 1917:

Countries.	Imports.		Exports.	
	1916	1917	1916	1917
Australia and Tasmania	$255,060	$164,571	$10,832	$8,684
Other British Oceania	43,455	70,166	23,115	76,194
British India	1,183,878	1,130,449	23	453
Canada	13,718	28,405	54,323	159,707
Chile	681,487	899,358	.....	40
France	3,906	7,902	.....	.....
Germany	170	2,507	.....	.....
Hongkong	380,192	428,126	3,317	5,348
Japan	3,113,622	3,406,571	50,121	203,752
United Kingdom	73,160	86,662	454	7,744
Other foreign	319,881	258,234	83,036	173,942
Total foreign	6,068,529	6,482,951	225,221	635,864
United States	28,029,681	39,875,390	64,445,631	74,480,119
Grand total	34,098,210	46,358,341	64,670,852	75,115,983

The following table shows domestic exports, by articles, fiscal years 1916 and 1917:

Articles.	United States, 1917.		Foreign, 1917.		Total, 1917.		Total, 1916.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Sugar:	*Pounds.*		*Lbs.*		*Pounds.*		*Pounds.*	
Raw	1,127,825,256	$60,137,962	.....	.....	1,127,825,256	$60,137,962	1,110,134,528	$52,507,295
Refined	34,779,800	2,603,202	32,741	$2,108	34,812,541	2,605,310	27,033,700	1,902,290
Coffee, raw	1,980,722	296,378	584,749	95,190	2,565,471	391,568	2,717,023	418,607
Fruits and nuts[1]	.....	8,179,178	.....	176,217	.....	8,355,395	.....	6,889,705
Rice	2,527,846	165,779	.....	.....	3,527,846	165,779	3,671,943	143,120
Hides	1,481,717	295,216	3,120	749	1,484,837	295,965	1,411,873	259,623
Other	.....	2,690,282	.....	350,544	.....	3,040,826	.....	2,493,691
Total	1,169,595,341	74,367,997	620,610	624,808	1,170,215,951	74,992,805	1,144,969,067	64,614,331

[1] Mostly pineapples.

Customs and internal-revenue receipts.—The customs receipts were $1,169,084.80, as against $1,161,051.12 for 1916. Since the organization of the Territorial government in 1900 the customs receipts have aggregated $22,960,258.79.

Shipping.—The aggregate number and tonnage of vessels calling at Hawaiian ports since 1901 is as follows: Entered (number) 8,134, tonnage 20,749,303; cleared 8,078, tonnage 20,684,216.

Territorial finances.—On July 1, 1905, local governments in Hawaii were established for the first time. The Territory was then divided

into four counties, one of which, namely, that comprising the Island of Oahu, was converted on January 1, 1909, into a city and county known as the city and county of Honolulu, with a mayor. The leper settlement on the Island of Molokai formed a fifth county, controlled by the Territorial board of health. The Territory continues to collect and pay over to the city and county of Honolulu and the counties of the Territory the greater part of their revenues, and in return receives back from them the cost of assessing and collecting taxes and the interest and sinking fund on bonds issued by the Territory for the benefit of the counties.

The income of the various counties aggregated $3,441,102.74, as against $2,763,976.29 for 1916, being an increase of $677,126.45 over the prior fiscal year. The assessment of property, real and personal, in the Territory during the year aggregated $231,920,919, as against $206,970,229 for 1916, being an increase of $24,950,690. The total revenues collected by the Territory and the counties aggregated $6,382,955.70, an increase of $962,270.67 over the year 1916. Of the above income, $3,441,102.74 was set aside for county governments and $2,941,852.96 remained for Territorial expenditures. The cash balance at the close of the fiscal year amounted to $794,406.30.

Bonded debt.—The bonded indebtedness of the Territory on July 1, 1916, was $8,024,000, which amount was decreased during the year by the payment of the 1905 issue of 4 per cent public-improvement bonds to the amount of $150,000, making the indebtedness at the close of the fiscal period $7,874,000. The bonded indebtedness at the close of the year was 3.39 per cent of the assessed value of the property; the limit of aggregate indebtedness is fixed by the organic act creating the Territory at 7 per cent of the assessed value of property, and the limit of the amount that may be incurred in any one year is fixed at 1 per cent.

Heretofore public improvements have been made out of the proceeds of the sales of Territorial bonds, whether the improvements were of a strictly Territorial or of a local nature, but during the past few years a distinction has been made requiring the local governments for whose benefit the bonds are issued to reimburse the Territory out of their revenues for the interest and sinking fund of bonds the proceeds of which are used for local improvements.

For securing the necessary funds bonds have been issued by the Territorial legislature as follows: August 1, 1911, $1,500,000; September 3, 1912, $1,500,000; and September 15, 1914, $1,430,000, yielding proceeds to the amount of $4,430,000, to which should be added $47,355.20 accrued interest on deposits of loan moneys pending their expenditure and $693.41, the balance of previous loans, making an aggregate of $4,478,048.61. Up to the end of the present fiscal year there had been expended out of the bond issues of 1911, 1912, and 1914 on various improvements $3,925,618.55, leaving an unexpended

balance of $552,430.06. The issue of 1911 was sold on the average at 101.5875, that of 1912 at 100.58875, and $1,430,000 of the issue of 1914 at 100.01.

It is notable that, irrespective of unstable financial conditions the world over, the Territory was able to sell its 4 per cent bonds at par or better. All of these bonds are accepted as security for United States deposits in national banks at their market value, not exceeding their par value, excepting the 3½ per cent bonds, which are accepted at only 90 per cent of their par value.

Territorial bonded indebtedness June 30, 1917.

Date of issue.	Term in years.	Interest.	Sale price.	Percentage basis.	Aggregate outstanding.	Date due.	Where sold.
		P. ct.					
Oct. 4, 1905	5 to 15	4	101.375	3.70	$450,000	Oct. 4, 1920	Honolulu.
Jan. 2, 1906	5 to 15	3½	98.125	3.66	750,000	Jan. 2, 1921	New York.
Oct. 1, 1907	5 to 15	3½	98.150	3.66	294,000	Oct. 1, 1922	Honolulu.
Oct. 1, 1909	5 to 15	3½	98.250	3.65	200,000	Oct. 1, 1924	Do.
Aug. 1, 1911	20 to 30	4	101.5875	3.88	1,500,000	Aug. 1, 1941	New York.
Sept. 3, 1912	20 to 30	4	100.5887	3.985	1,500,000	Sept. 3, 1942	Do.
Sept. 15, 1914	20 to 30	4	100.01	4.00	1,430,000	Sept. 15, 1944	New York and Honolulu.
May 15, 1916	20 to 30	4	100.00	4.00	1,750,000	May 15, 1946	Do.

Outstanding indebtedness June 30, 1917, $7,874,000.

Bank deposits and insurance.—Twenty-two banks were in operation during the year—10 on the island of Oahu, 6 on the island of Hawaii, 4 on the island of Maui, and 2 on the island of Kauai. Two are national banks—1 at Honolulu and 1 on the island of Maui; 1 is solely a savings bank, 2 solely commercial, and the remainder both commercial and savings banks.

Bank deposits at the end of the year amounted to $32,692,021.01; of this amount, $10,205,496.70 were savings deposits and $22,486,524.31 commercial deposits.

Fire-insurance premiums amounted to $692,232.98; fire losses to $53,217.44. Marine premiums amounted to $302,488.43; losses, $18,233.73. Life insurance written was valued at $4,088,336, the premium paid thereon $182,038.60, and the losses paid aggregated $166,129.69.

Corporations.—During the year 38 mercantile, 11 agricultural, 1 bank, 8 eleemosynary, 1 trust, and 3 savings and loan—62 in all—were created, and 41 mercantile and 4 agricultural were dissolved, leaving at the close of the year 753 domestic corporations, an increase of 17 in all. The total capitalization of domestic corporations other than eleemosynary, etc., is $170,076,228, an increase of $8,160,700, or 4 7/10 per cent for the year. The following corporations, to the number of 153, as compared with 154 of the preceding year, were authorized to do business in the Territory. Two national banks did business in the Territory as compared with 5 of the preceding year.

Population and its problems.—The estimated population, including that of the Army and Navy, on June 30, 1917, was 250,627, an increase of 58,718, or 30.59 per cent since the census of 1910. The estimated population of Honolulu, the capital of the Territory, is 71,950. The population of the islands is divided as follows: Hawaiian, 23,450; part Hawaiian, 15,850; Portugese, 23,990; Spanish, 2,920; Porto Rican, 5,240; other Caucasian, 30,118; Chinese, 2,100; Japanese, 102,479; Filipinos, 19,100; all others, 5,389; total, 250,627.

The total number of births during the year was 9,365, an increase of 489 over the number for the previous year, showing a birth rate of 37.36 per 1,000, estimating the population at 250,627. The total number of deaths from all causes was 3,498, a decrease of 442 over the previous year, showing a death rate of 13.96 per 1,000 on the same estimated population. The marriages totaled 2,762, an increase of 46. The estimated population and births of the registrar of vital statistics and those furnished through the courtesy of the Japanese consulate for the period are: Births (Japanese), territorial registrar (registered), 4,260; Japanese consulate, 4,918.

Public health.—Territorial boards of health, assisted by local Government organizations and individuals, handled the greater part of the public health work. The United States Public Health Service and the Territorial Board of Health accomplished a great deal through cooperative efforts. During the past year the health conditions have been good. This statement is based on analysis of the year's mortality and morbidity reports, which show that, notwithstanding an increase in the population, there were 442 deaths less as well as a decrease of 2,573 in the number of contagious diseases reported. During the year the board of medical examiners recommended licenses for 12 practitioners, and at the close of the fiscal year there were 138 licensed physicians in the Territory, divided as to nationality as follows: American, 72; Japanese, 44; British, 11; Germans, 4; Chinese, 4; Portuguese, 1; Norwegian, 1; and Korean, 1.

Whenever desirable the various islands in the Territory are visited, and the regular educational work on health and sanitation is carried on. The Territory employs 25 physicians, who collectively visited 1,074 homes, received 8,564 office calls, filled 16,410 prescriptions, examined, exclusive of Honolulu, 18,185 school children, vaccinated 3,235, performed 53 post-mortems, traveled 37,528 miles, at an expense of $25,225.19. There were made in Honolulu 88 autopsies, of which number 30 were for the Territory and 45 for the coroner. Investigations of unattended deaths were made in 68 cases. There are 38 dentists in practice in the Territory, 5 new members of the profession having been admitted during the year. Four institutions for the treatment of leprosy are provided. These are the leper settlement on the island of Molokai, a leper hospital at Kalihi, and a

home for nonleprous boys and girls, and girls of legrous parents on Honolulu. During the year 32 patients were received and 63 died. At the close of the year there were 587—42 less than the previous year. Of these, 358 were male and 229 female. At the Kalihi hospital there were 44 patients at the beginning of the year, 52 were admitted, 1 released, 5 released on parole, 3 died, 32 were transferred to the leper settlement, 3 discharged as not lepers, leaving 52 in the hospital at the end of the year. There were 396 at the Home for Boys, the same number as at the close of the preceding year, and 60 girls as compared with 56 for the prior year. The nationality of the leper population was as follows: Hawaiian, 369; Part-Hawaiian, 108; Portuguese, 47; Chinese, 24; Japanese, 12; Korean, 10; Filipino, 4; German, 4; American, 3; Porto Rican, 2; Spanish, 2; and Belgian, 1.

Sanitation.—The work of the sanitary engineer is becoming more important each year as the scope of the work broadens. Considerable work was done in connection with the water supply at Nuuanu Valley and Hildebrand Glenn, though this water supply is not yet up to the standard adopted by the United States Public Health Service. A large number of water supplies all over the islands was investigated and numerous analyses made. The sewerage system for the new sanitarium at the insane asylum was laid out, numerous typhoid cases were investigated, and laboratory facilities were improved at the Hilo chlorination plant. The rat and mosquito campaign has been continued, with satisfactory results. No new infections are brought into Honolulu by the many ships calling at that port from the plague centers of the Orient and the west coast of South America.

Public lands.—The following table shows the total area of Government lands and their estimated valuation as of June 30, 1917:

Public lands of the Territory of Hawaii as of June 30, 1917.

Classification.	Area.	Total area.	Valuation.[1]	Total valuation.[1]
	Acres.	*Acres.*		
Agricultural lands		52,110.80		$3,974,353.85
Cane lands	31,659.19		$3,387,515.25	
Other agricultural lands	18,793.38		419,444.60	
Rice and taro lands	1,299.39		163,860.00	
Fish ponds, etc	358.84		3,534.00	
Net homestead area		30,931.27		883,955.12
Homestead lots, amount unpaid	13,945.24		293,287.66	
Homesteads opened, untaken	12,314.79		280,463.55	
Homesteads, surveyed, not opened	4,637.24		310,203.91	
Homesteads, exchanges and reserves		1,788.08		105,375.00
Pastoral lands (not cultivable)		486,107.07		1,361,303.63
Total saleable lands and valuation		570,937.22		6,324,987.60
Total forest lands		565,030.87		2,751,266.00
Forest lands	215,085.35			
Forest reserves	349,945.52			
Total area of lands of value		1,135,968.09		
Waste lands absolutely of no value	507,950.69	507,950.69		
Total public lands		1,643,918.78		9,076,253.60

[1] Estimated.

Homesteading.—There were taken up during the year 139 homesteads, covering an area of 4,957.835 acres, at valuations aggregating $55,220.41, or $11.13 per acre on the average. The homesteads taken averaged 35.667 acres each. They were taken by different nationalities, as follows: Hawaiians, 89; Portuguese, 24; Americans, 8; and others, 18. To enable homesteaders to obtain homesteads of suitable size for their needs, they are given the option of taking one or two or, in some cases, three lots. There were taken under special homestead agreements, 69; under certificates of occupation, 9; under right-of-purchase leases, 45; under cash freehold agreements, 8; and as homestead leases, 5; special sales agreements, 3.

During the year 31 homesteads were surrendered or forfeited, covering an area of 736.926 acres. During the same period 60 transfers of homestead lots were made, having an area of 1,083.796 acres.

Homestead roads were constructed out of the entire proceeds of homestead sales, rentals under right-of-purchase leases, and interest on deferred payments. Homesteaders are given advice and assistance in various ways by the United States experiment stations, the Territorial marketing division, the College of Hawaii, and the bureau of agriculture and forestry.

Sales may also be made of lots for other than homestead purposes of not exceeding 3 acres for residence and railroad purposes, irrigation ditches, factories, mercantile establishments, hotels, churches, private schools, etc.

During the year there were sold at auction for cash seven residence lots in Kapaa, Kauai, aggregating 2.65 acres, for $3,455; one residence lot at Puhonua, Hilo, Hawaii, of 3 acres, for $1,020; one Government remnant at Kula, Maui, of 2.50 acres, for $41; one church lot in Puukapu, South Kohala, Hawaii, of 0.542 acre, for $35; two church lots in North Hilo, Hawaii, aggregating 4.36 acres, for $506; one residence lot in Hilo, Hawaii, of 0.72 acre, for $501; one pasture lot of 2 acres for $165; three mercantile sites, aggregating 21.078 acres, for $5,076; making total sales at auction of 17 lots, aggregating 36.85 acres, for $10,799.

Leases and licenses.—During the year 64 general leases were sold at public auction, aggregating 14,587.444 acres, at rentals aggregating $10,492.70 yearly. Of these, 28 were tracts of pastoral land, aggregating 13,878.352 acres, at rentals aggregating $3,180.50; 19 were tracts of agricultural land, aggregating 630.951 acres, at rentals aggregating $3,150; 6 fishponds, aggregating 60.79 acres, at rentals aggregating $1,627; 5 were mercantile sites, aggregating 4.449 acres, at rentals aggregating $2,333; 3 were town lots, aggregating 6.872 acres, at rentals aggregating $104.20; 2 were church sites, aggregating 3.03 acres, at rentals aggregating $47; and 1 was a camp site of 3 acres, at a rental of $51. Six land and water licenses

were issued and a number of transfers, exchanges, and purchases of lands for public purposes were made.

Patents.—There were issued during the year 255 patents covering an area of 3,790.714 acres, for considerations aggregating $180,143.62, or at the rate of $40.07 per acre. Of these, 47 were right-of-purchase leases, 23 land exchanges, 122 time payments, 9 cash freehold agreements, 20 cash purchases, 28 preference rights, 5 compromises with abutting owners, 1 homestead under acts of 1892 and 1895.

There was also issued one patent based on land commission awards upon payment of commutation, the area being 0.567 acre and the commutation $22.50.

Revenues and disbursements.—The total receipts of the land department were $375,126.94, as compared with $373,306.29 for the preceding year. The expenditures of the land department for the year were $34,348.29, of which $15,203 was from appropriations made by the legislature and $19,145.29 from the proceeds of public lands, which may be used for surveying and opening homesteads under the terms of the organic act.

Telegraphs and telephones.—In addition to the cable connection between both shores of the Pacific Ocean, which has been in operation for a number of years, there are two powerful wireless plants which link the Territory to the continental United States and the Orient, and also form connections in the world-girdle wireless system. There is also in operation between the various islands a wireless system.

Since April 6, 1917, the date of the declaration of a state of war between the United States and the Imperial German Government, the United States naval authorities have taken full possession of all radio plants in the Territory and are at present operating the Mutual, Federal, and Marconi stations under the direction of the United States Naval Communication Service with a full naval personnel. A strict censorship, also under the direction of the United States Naval Communication Service, has been maintained at the cable office.

On March 1, 1901, the Mutual Telephone Co. commenced the operation of its wireless system connecting the islands of Oahu, Hawaii, Kauai, Maui, and Molokai, and has continued ever since. The success of the interisland wireless system is due to a large extent to the excellent telephone service that the five larger islands are enjoying. Messages are telephoned direct to the party for whom intended from the stations on the various islands, with the exception of a direct telegraph line connecting the city of Hilo, Hawaii, with the wireless station of that island at Kawaihae. In the cities of Honolulu and Hilo messages are delivered by messenger boys. In addition to the interisland service, communication is maintained

between the Oahu station of this system, situated at Wahiawa, and ships at sea, as well as with the United States naval station at Tutuila, Samoa, and also with the radio station at Apia, Samoa (British), and by relay with this station with the French possession of Tahiti (Society Islands).

The Federal Wireless Telegraph Co. begun commercial operation with San Francisco in August, 1912, and has been in continuous operation with that city since that date. This company has one station at Heeia, on the island of Oahu, about 12 miles from the city of Honolulu. The Heeia station has been in direct communication with Arlington, Va., also Tuckerton, N. J., a distance of approximately 5,000 miles. This station has also been in communication with Darien, Panama Canal, and on one occasion heard a station in Germany transmitting messages to Tuckerton, N. J., which is approximately 10,000 miles from Honolulu. It is also used for communicating with ships at sea, and has been in direct communication with ships equipped with Federal apparatus at a distance of 1,900 miles, daylight. This station has a radius of about 6,000 miles for daylight work, for which 30 to 50 kilowatt power is used.

Transportation.—The American-Hawaiian Steamship Co. handled a majority of the freight traffic between the Territory and the Atlantic coast, either by way of the Panama Canal or overland. It has made arrangements with the transcontinental roads for the handling of sugar which was contracted for delivery in New York and Philadelphia. It has a fleet of 19 vessels, of which 2 are engaged in Hawaiian Island trade. The Matson Navigation Co. handles a large portion of traffic—freight and passenger—between the Territory and the Pacific coast. It operates a fleet of 19 steamships between Puget Sound ports, San Francisco, and Hawaiian ports of call. A regular passenger and freight service is maintained between San Francisco and Honolulu on a 28-day schedule, which allows for weekly sailings in either direction. The Great Northern Pacific Steamship Co. renewed for the tourist season of 1916–17 their service in the Hawaiian trade with the steamship *Great Northern.* The standard Oil Co., the Associated Oil Co., and the Union Oil Co. operated a number of vessels, carrying kerosene, lubricating oil, distillate, etc.

Education.—During the year there were maintained 168 public schools, with 855 teachers and 32,282 pupils, a percentage of increase of 6.9 over the past year, the largest increase since 1913, during which year the enrollment was 26,631 and the percentage of increase over prior years 8. The cost for general maintenance of the schools during 1917 was $9,057,658.55. The cost of new buildings was $91,209.88. Efforts made to increase the efficiency of the schools by bringing up the average of daily attendance have been successful, the attendance for the Territory during the past year having been 93.8. The num-

ber of private schools was 51, having 316 teachers and a total attendance, male and female, of 6,746. The number of pupils of all races in public and private schools was 39,028, as against 37,945 for 1916, an increase for the present year of 1,083.

In addition to the foregoing there were in the Territory 137 Japanese schools, in which the Japanese language and other subjects that are peculiarly Japanese are taught. These schools are not regarded as in line with the private schools, for the reason that their curriculum does not replace that of the public schools. These schools had an attendance during the year of more than 14,000. The schools are located as follows: 34 on the Island of Oahu, 11 in the city of Honolulu, 24 on Maui, 54 on Hawaii, 24 on Kauai, and 1 on Molokai.

The college year for 1916–17 has been one of satisfactory progress. There has been a steady increase in the number of undergraduate students registered for a degree, there having been 27 per cent more of this class of students than in the previous year. The 110 students enrolled were divided as follows, according to nationality: Caucasian, 79; Chinese, 13; Japanese, 8; Hawaiian or part Hawaiian, 5; Korean, 4; and Hindu, 1.

There are two industrial schools in the Territory, one for boys, on the Island of Oahu, and one for girls, near Honolulu. Delinquents of all nationalities are received and cared for in these schools. The schools are more than self-sustaining, the character of instruction being principally of a vocational nature, and children receive a portion of their earnings.

Forestry.—Two new forest reserves were set apart by Executive proclamation during the year—the Roundtop Reserve, consisting of 115 acres, adjacent to Honolulu, and the Panaewa Forest Reserve, consisting of 1,750 acres, 4 miles outside of Hilo and along the road leading to the volcano of Kilauea—making the total number of forest reserves in the Territory 40, with an aggregate acreage of 800,094. The planting of trees has continued on an increased scale during the past year; 660,079 trees were raised and distributed throughout the islands, and during the same period 925,400 trees were planted. Of this number, 43 per cent were planted for water conservation, 35 per cent for fuel, 16 per cent for windbreak, and 6 per cent for timber and ornaments. Considerable progress has been made in the introduction of trees from other tropical countries which will be suitable for the purposes of watershed cover and timber production.

The Marconi Wireless Telegraph Co. during the year established regular commercial service between the Kahuku station, on the Island of Oahu, and the station at Funabasha, Japan, the latter having been placed in commission by the Japanese Government. This service was opened to the public on November 15, 1916. The circuit

readily developed to that point of efficiency where it was necessary to provide for additional facilities in order to give the traffic proper and prompt handling, resulting in an order being issued by the executive office in New York for the opening of the Koko Head station and the installation of the latest automatic equipment. This was well under way when war was apparent, and the taking over of the company's properties on April 6, 1917, by the Federal Government stopped all progress. Plans are under way, however, to resume as soon as the company again gets possession of its stations on this island.

Territorial legislature.—The Ninth Legislature of the Territory of Hawaii convened on February 21, 1917, the session covering the full 60 days authorized by law. Among the important legislation enacted was the following: An act creating a commission to increase, conserve, regulate, and control food supplies of the Territory; for an annual Territorial fair at Honolulu; for the transfer of the division of hydrography to the department of public lands; for broadening the penalty and grounds for punishment of frauds on life insurance companies; for protecting libraries, galleries, museums, and exhibits; for amending the banking laws; authorizing the board of health to subpœna and examine witnesses under oath; providing for a division of plant inspection and entomology; prohibiting establishment of private schools without the approval and consent of the department of public instruction; authorizing the keeping of proper accounts relating to the income tax; amending the law in relation to the National Guard; fixing an income tax of 1 per cent on all incomes over $4,000; fixing the minimum pay for teachers in public schools at $40 per month; providing for a trade and vocational school at Lahainoluna, Maui; amending the laws relating to the parole of prisoners and authorizing county treasurers, with the approval of the supervisors, to issue bonds; providing for the display of patriotic emblems in courthouses and court rooms; providing a schedule of salaries for public-school teachers; providing an insurance law; providing for the revocation of licenses to practice medicine and surgery; providing for a school for the blind and other defective children; providing for the taxing of automobiles and incomes; providing for the registration of nurses; for the use of the Bertillon finger-print system; to prevent the adulteration of food; defining and regulating the practice of optometry; authorizing registered voters to exercise suffrage when in the military service; forbidding nonresidents to sell stock of foreign corporations except under certain conditions; pensioning officers, firemen, bandsmen, and other dependents; defining inheritance tax; amending the workmen's compensation act and the frontage tax, etc.

ELEEMOSYNARY INSTITUTIONS.

ST. ELIZABETHS HOSPITAL.

Movements of population.—On June 30, 1917, there were remaining in the hospital 3,244 patients, as against 3,193 remaining June 30, 1916, an increase of 51 patients over the previous year. There were admitted during the year 898 patients, which was the largest number ever received in one year. The total number of patients treated during the year was 4,091. The number of discharges, including deaths, was 847. The daily average population was 3,209, as against 3,123 for the previous year, an increase of 86 patients.

Patients during the fiscal year ended June 30, 1917.

	Male.		Female.		Total.
	White.	Colored.	White.	Colored.	
Remaining June 30, 1916	1,927	414	543	309	3,193
Admitted during year 1916-17	542	126	146	84	898
Total number under treatment during the year ended June 30, 1917	2,469	540	698	393	4,091
Discharged:					
Recovered	132	19	37	12	200
Improved	55	6	23	8	92
Unimproved	60	12	14	14	100
Not insane	17	2	.....	1	20
Died	243	83	70	39	435
Total discharged and died	507	122	144	74	847
Remaining June 30, 1917	1,962	418	545	319	3,244

Training school.—Eighty-seven attendants entered the examination, 63 of whom passed and were admitted to the junior class. Six have resigned. Nine have been discharged and 7 failed in their examinations, leaving 41 who have been promoted to the senior class. At the beginning of the term there were 43 members in the senior class, 4 of whom resigned, 8 were discharged, and 2 failed on final examination. Graduation exercises were held in Hitchcock Hall June 21, 1917, 28 members of the senior class receiving diplomas.

Staff conferences.—During the year 1,061 cases were presented to the conference for consideration, of which 537 were presentations for the first time and 524 had been previously under consideration.

Hospital work.—During the year 26 major surgical operations were performed by the consulting staff. In the hydrotherapeutic department the average number of patients treated per month was 266; of these 208 were white and 58 colored. In the dental department 1,350 patients received treatment at various times. In the eye, ear, and throat department 528 patients received treatment. Four hundred and seventy cases were considered by the clinical psychiatrist and

assistant. In the photographic department there were prepared 797 plates and 863 prints of patients for the general records, 37 plates and 47 prints for the administration department, 1 plate and 2 prints for the scientific departments, and 18 prints of X-ray plates for records. In the pathological laboratory, there being only one worker in pathological and clinical pathology, the work of the examination of brains in post-mortem cases was discontinued. The usual pathological examinations, however, have been carried on. In addition thereto examinations of milk have been made for the institution, etc. The number of autopsies performed was 184, the greatest in the history of the laboratory. The work of the psychological laboratory has been conducted along the usual lines.

Industrial departments.—Efforts made to increase the work of the industrial departments of the institution have been successful, and there have been increases in the number of patients so employed with benefits to themselves as well as to the institution. Brush making, brooms, and stocking-knitting machines have been installed, likewise mattress shops, upholstery departments, shoe manufacturing, and hat making have also been inaugurated with success. These industrial efforts have been directed primarily to therapeutic ends, and have been of considerable value.

Cost system.—The cost system as introduced in the hospital during the past year has been carefully worked out and extended to take in many departments not previously included. The results secured through this system of unit prices are gradually being perfected in the hope that at some future date absolute accuracy may be secured. In working out this system it was found that in taking inventories wrong values had been placed on some items, proper depreciation had not been noted, and the cost of some things had been charged to one department which should have properly been charged to another. These defects have been corrected. A publication has been started, known as the Sun Dial, for circulation among the patients and employees. Two numbers have been published, and the third is now in press. It will doubtless fill a long-felt want and prove to be a valuable means of communication between the staff officers, patients, and employees of the institution.

An automatic telephone system, consisting of 20 branches, is being installed in the administration building and the buildings adjacent thereto. One branch will be placed in each office and on the second floor of the administration building, and through this system communication may be had with the occupants of each of these buildings without the necessity of going through the hospital switchboard. This, it is hoped, will be the forerunner of a general intrahospital service, with connections in every building, of a telephone system entirely owned

by the Government. It would be of great economic value and would do away with the necessity of paying a yearly rental.

Improvements.—The new construction provided for in the last appropriation and under way at the end of the fiscal year includes an iron fence along the east side of Nichols Avenue; a new storehouse building to accommodate in the main the supplies of the Engineer Department, including electrical supplies and quarters for the painter and tinner; a new cold-storage plant, now being installed in the old boiler house, which was abandoned at the time the heating plant was concentrated. This new ice plant will replace the old one, which is poorly located, well worn out, and of insufficient capacity.

Fiduciary relations with the District of Columbia.—During the past fiscal year bills to the District of Columbia for board for District indigent patients have been promptly settled. During the past year bills were rendered upon a basis of 70 cents per day, or $255.50 per annum, for each patient, this being the exact cost of board and maintenance. Included in this cost, in accordance with the act of Congress of August 24, 1912, was the amount for repairs of buildings and keeping the roadways of the institution in good condition and for new roadways. The average number of patients in the institution from the District of Columbia during the year was 1,735, a daily average increase of 32 patients.

Conditions brought about by war.—St. Elizabeths Hospital is essentially and primarily a military institution and was built to provide accommodations for the insane of the military forces. The declaration of war means that these forces will be vastly increased in size and that accommodations for the insane will have to meet correspondingly larger demands. The hospital has made estimates for building semipermanent structures on the plan of the Army hospital units to take care of increased demands, and also made recommendations which if carried out will mobilize for use by the military forces all of the beds in public institutions throughout the country caring for the insane.

New legislation.—The superintendent calls attention to the fact that at the present time the institution has the greatest number of inmates ever admitted thereto. He states that—

> The buildings are beginning to be crowded, and there are practically no vacancies for new admissions. The female department has few vacancies at this time, and the male department, outside of the criminal and tubercular wards, approximately no vacancies. Our admissions are increasing. We therefore must make arrangements to house a larger population. To do this it will be necessary to ask for legislation authorizing the construction of additional buildings. We already have a deficiency estimate before Congress asking that they appropriate $200,000 for the construction, equipment, and furnishing of such semipermanent buildings as may be required to provide additional accommodations for patients, this sum to remain available until expended. This

legislation was requested on account of the war conditions which exist at present and to meet the influx which must take place from the increased size of the military forces of the countrty. If this institution must take care of all the insane from the enlarged Army and Navy it will be necessary to build many additional buildings. The idea we have in view at the present time is to build these of a semipermanent character, as described in our estimates, to hold appproximately from 30 to 40 patients each, more or less; to build them in as many different styles as necessary to meet the needs as they may arise; to group these buildings and build central kitchens and congregate dining rooms. This sum may be only a beginning, and, in fact, as explained in a letter to Congress asking for legislation, it would be practically impossible to house all the patients that would be sent here upon the grounds now composing the institution even if we had sufficient appropriations to build the buildings that could be placed thereon.

Transfer of patients to other institutions.—As explained under the preceding item, if Congress should authorize us to build up every portion of the land of which the hospital is at present composed we would not have sufficient room to house all the patients that we would have to look after from the increased military and naval forces of the country, and we therefore thought it advisable to request Congress to pass legislation that would permit the transfer of military patients to all institutions of the country that would receive them under the same conditions as these patients are sent here—the Federal Government to pay for the care of these patients in the same manner as they care for the patients of this institution.

Needs of the hospital.—In 1912 a committee consisting of Surg. Gen. George H. Torney, United States Army, representing the Secretary of War; Surg. A. W. Dunbar, representing the Secretary of the Navy; Mr. Robert V. La Dow, superintendent of prisons, representing the Attorney General; Maj. William J. Judson, Corps of Engineers, United States Army, representing the Commissioners of the District of Columbia; Mr. Scott C. Bone, representing the board of visitors of the Government Hospital for the Insane; and Dr. William A. White, superintendent of the Government Hospital for the Insane, representing the department, were, after consultation with the President, designated by the Secretary of the Interior to make a thorough investigation of the needs of the hospital and the future policy for its growth and development; their report was subsequently transmitted by the President to Congress for consideration. (S. Doc. No. 256, 62d Cong., 2d sess.) This report discusses very fully the needs of the hospital under four heads: (*a*) Defects in the laws governing the conduct of the institution and the commitment of patients. Under this head is included a draft of proposed legislation for commitment from the District of Columbia, along with certain changes in the legislation with reference to the transfer of Federal prisoners to the hospital. (*b*) The advisability of continuing in the hospital patients committed from the District of Columbia and from the

Army and Navy and from distant points. Under this head is discussed the whole question of the future policy of the hospital with reference to the commitment of patients from distant points. (*c*) The policy to be adopted relating to the growth of the institution, and the matter of additional lands, buildings, equipment, etc. Here the question of administration, size of the institution, and its physical needs are discussed, together with a special report as to the care of the criminal insane. (*d*) The present conduct of the institution, including recommendations for improvement of the service and the advancement of the interests of the inmates. Under the third section the needs of the hospital are set forth.

During the first session of the Sixty-fourth Congress, Senate bill 6222 was introduced "To provide for admissions to the Government Hospital for the Insane, and for other purposes," drawn along the lines recommended in the above-mentioned report, and was referred to the Senate Committee on the District of Columbia. This bill has the approval of the department, as well as of the Commissioners of the District of Columbia, and should be enacted into law at the earliest practicable date. The recommendations contained in the above-mentioned report are commended to the further consideration of Congress.

FREEDMEN'S HOSPITAL.

Movement of population.—There were received into the hospital during the year 3,886 patients, including 360 births. These, with 215 remaining from the preceding year, make a total of 4,101 indoor patients receiving care and treatment. Of those received, including births, 1,828 were indigent residents of the District of Columbia, 1,683 were indigent residents of the States, and 375 paid for their treatment.

There were discharged during the year 3,856; of this number, 1,993 as recovered, 1,274 improved, 242 unimproved, 35 not treated, and 312 died. At the close of the year there were remaining in the hospital 245 patients; 147 United States indigents, 82 District of Columbia indigents, and 16 pay patients.

There were 3,078 surgical operations performed, as against 2,967 the preceding year.

In the dispensary, or out-patient department, 8,676 were treated in the several clinics: Medical, 2,496; gynecological, 777; ear, nose, and throat, 1,050; eye, 1,267; pediatrics, 1,027; dermatology, 550; orthopedic, 265; neurology, 177; minor surgery, 418; genito-urinary, 590; and tubercular, 59. Those attending these clinics made 14,858 revisits and required 2,971 surgical dressings during their treatment.

Additional sleeping quarters for nurses are needed, so as to permit the employment of a larger number of nurses to care for the increased number of patients treated each year. The necessities of war, also,

make it urgent that a larger number of nurses be trained. The additional sleeping quarters necessary can best be had by adding another story to the present nurses' home, which would cost not more than $20,000.

The recommendations concerning the several items enumerated in the last annual report of the hospital under this head as necessary for its full development are respectfully renewed, the most important of which is the pathological building. With the onward march of medical science, the urgency for such a building increases year by year, and it is earnestly hoped that Congress will make the necessary provision in the near future.

An increase in the appropriation for the support of the hospital is of great importance. It is quite certain that all of the activities of the hospital can not be continued through the year on their present scale without creating a deficit. Last year the abnormally high cost of the necessaries of life bore very heavily upon us in the struggle to make ends meet, and the continued mounting prices of all articles used for hospital work make it quite certain that a deficiency appropriation will be needed to carry on this branch of the public service. During the current fiscal year, even with the greatest economy, it is estimated that the food supplies will cost approximately $8,000 more than last year, while the cost of fuel, medical and surgical supplies will be $6,000 more.

Provision should be made for a dietitian. In the care of the sick it is important that there should be scientific care in the preparation of food and the prevention of waste. Under the present regulations the food is prepared under the supervision of the steward, who, while doing his best, is not a skilled dietitian, and, of course, the results are not what they should be at all times.

Six thousand dollars are needed for repairs to the buildings and to provide new window curtains throughout the hospital.

Training school for nurses.—The demand for service in this department of the hospital was unusually heavy on account of the increased number of patients under treatment. While the service rendered by the nurses was, on the whole, satisfactory, better results could be had if the number of nurses could be increased so as to permit an eight-hour shift. This is regarded as very essential to efficient nursing as well as to the health of the nurse.

At the beginning of the year satisfactory arrangements were made whereby the senior class received special instructions in diatetics at Howard University. The intermediate class was given, in addition to their regular course of instruction, a course of lectures on public-health nursing.

The graduating exercises were held in the Andrew Rankin Memorial Chapel, May 2, 1917, 21 nurses graduating, making a total of 298 holding certificates from the school.

Pay patients.—In the act "making appropriations to provide for the expenses of the District of Columbia for the fiscal year ending June 30, 1913, and for other purposes," approved June 26, 1912, provision is made, under the head of "Medical charities," as follows:

> Hereafter patients may be admitted to Freedmen's Hospital for care and treatment on the payment of such reasonable charges therefor as the Secretary of the Interior may prescribe. All money so collected shall be paid into the Treasury to the credit of Freedmen's Hospital, to be disbursed under the supervision of the Secretary of the Interior for subsistence, fuel and light, clothing, bedding, forage, medicine, medical and surgical supplies, surgical instruments, repairs, furniture, and other absolutely necessary expenses incident to the management of the hospital, a report as to the expenditure thereof to be made annually to Congress.

Under this provision 375 pay patients were received for treatment during the fiscal year 1917, the receipts for the same amounting to $7,382.90.

Receipts and disbursements.—The receipts and disbursements of the hospital are as follows:

Receipts:		
Appropriation, sundry civil act—		
For support	$28,000.00	
Salaries	32,640.00	
		$60,640.00
Appropriation, District of Columbia (under contract with Board of Charities)	35,000.00	
Pay patients	7,382.90	
		42,382.90
Total		103,022.90
Disbursements:		
Miscellaneous—		
Fuel, light, clothing, forage, medicine, etc	32,131.12	
Pay patients	2,079.40	
Subsistence	30,770.02	
Pay patients	2,691.48	
Salaries	32,558.79	
Pay patients	2,275.16	
Refunds, pay patients	311.25	
Total		102,817.22
Balance		205.68

HOWARD UNIVERSITY.

The university was incorporated by the act of March 2, 1867 (14 Stat., 438). The object of the incorporation named in the first section of the act was "for the education of youth in the liberal arts and sciences." It is declared that the incorporators shall be "a body politic and corporate, with perpetual succession," etc. The management and control of the institution were vested in a board of not less than 13 trustees.

Students.—There were in attendance during the year 1,476 students from 38 States and 10 foreign countries. This number does not include 89 students who, by correspondence, took the work in the school of theology. The increase in attendance in the medical school, especially in the dental college, and the academy was noticeable.

Students during year ended June 30, 1917.

College of arts and sciences	370
Teachers' college	149
School of manual arts and applied sciences	40
Conservatory of music	114
School of theology	57
School of medicine	320
School of law	86
Academy	326
Commercial college	91
Total	1,553
Names duplicated because of students taking special coures in different departments	77
Net total	1,476
Correspondence students not counted above	89
Final total	1,565

Two hundred and forty-two completed their studies in the university and were graduated, distributed as follows:

Graduates in 1917.

College of arts and sciences	42	Medical college	13
Teachers' college	21	Dental college	36
Normal course	10	Pharmaceutic college	14
Kindergarten	3	School of law	26
Domestic science	2	Academy	38
School of manual arts and applied sciences	1	Commercial college	19
Conservatory of music	2	Total	242
School of theology	15		

The president of the institution in commenting upon the work of the past year says:

The great outstanding experience of Howard University in the school year just closed is the effect which was produced upon the student body by the entrance of the United States into the war against Germany. The months of the fall and winter were more alive with the problems brought forward by the war, but when war was declared by our Nation it became evident that the great majority of our students would pass through experiences which would be totally unknown in normal times.

We have not encouraged any undue excitement, but have clearly stated to the students that the proper handling of the great thoughts springing from world

conditions was an education in itself not to be found in textbooks. It became evident that deep patriotic feeling abounded within our ranks, and as the second semester passed by this feeling took shape in a proffer of services to the Government and later on in the enrollment of many instructors and students for the training camp at Des Moines, Iowa. It is gratifying to know that when examinations took place under Army officers far fewer rejections were necessary in our student body than in a corresponding number from general life. This speaks loudly for the success of the methods pursued by the university for the physical welfare of its members.

Our work has been very much cramped the past year by lack of classrooms for our enlarged student body and by the lack of means to establish some very necessary courses if we are to send out our students fully furnished for the work of life. We need buildings, money for endowment, and for current expenses.

During the year the university celebrated the fiftieth anniversary of its foundation by appropriate exercises. The occasion brought out historical reminiscences and deepened the sense of the part which the institution is taking in the life of the Nation and the world.

Appropriations.—Although the institution was established in 1867, no appropriation was made by Congress for its support until March 3, 1879, when $10,000 was appropriated for "maintenance." From that date up to June 13, 1917, the date of approval of the last sundry civil act, Congress has appropriated for the university for various purposes a total of $1,983,340.

All of the Government appropriations are expended by the Secretary of the Interior, who is a patron ex officio of the board of trustees.

Property.—The treasurer of the institution, in a report dated September 1, 1917, gives the total value of all property belonging to the university at the close of the fiscal year, June 30, 1917, as $1,759,194.97, of which $429,002.64 represents endowments, unproductive land fund, cash in bank, etc. The remainder of the property belonging to the university, valued at $1,330,192.33, consists of the following: Land, $616,057.47; buildings, $559,009.77; and equipment, $155,125.09.

This large property has been accumulated mainly from donations and the sale and the increase in value of about 120 acres of land originally purchased and subdivided by the university. The annual congressional appropriations have been mainly for the payment of salaries, the purchase of supplies, care of grounds, and other current expenses. Two buildings and a portion of the equipment have also been provided from Government appropriations.

COLUMBIA INSTITUTION FOR THE DEAF.

The number of deaf pupils and students remaining in the institution on July 1, 1916, was 114; admitted during the year, 56; total, 170; admitted for the school year 1917–18, 46. From July 1, 1916, to July 1, 1917, there were under instruction 95 males and 75 females, a

total of 170, of which 117 have been in the collegiate department, representing 37 States and the District of Columbia, and 53 in the primary department. Of these, 40 were admitted as beneficiaries of the District of Columbia. During the fiscal year 45 were discharged from the institution by graduation and otherwise.

The health of the pupils and students has been excellent during the year. A few cases of measles occurred, but there were no deaths and no cases of serious illness.

The course of instruction has been carried out with slight additions as during the previous year. Plans have been made for the addition of further instruction in applied art and in printing.

The total receipts of the year, excluding balance of $516.54 in the private funds, were $104,306.54; the total expenses were $103,359.94; leaving a cash balance on hand June 30, 1917, of $946.60.

Estimates of appropriations for the fiscal year to end June 30, 1919, are as follows: For the support of the institution, including salaries and incidental expenses, for books and illustrative apparatus, and for general repairs and improvements, $98,000; for repairs to the buildings of the institution, including plumbing and steam fitting, and for repairs to pavements within the grounds, $6,000.

The work on the new dormitory for women authorized by Congress has made such progress during the year that it will be possible to open it for occupancy during the fall of the present year. The work in connection with this new building and the expenditure of the appropriation therefor is placed by Congress under the supervision of the Superintendent of the Capitol Building and Grounds.

At the close of the year the degree of bachelor of pedagogy was conferred upon three normal fellows, the degree of bachelor of arts upon seven graduates of the college, the degree of bachelor of science upon one graduate, the degree of bachelor of philosophy upon one graduate, and the degree of bachelor of letters upon two graduates. Certificates of graduation were granted to two normal students.

Notable gatherings of educated deaf people and of educators of the deaf were held near the close of the fiscal year at Hartford, Conn., special exercises being held in honor of the one hundredth anniversary of the foundation of the first school for the deaf at Hartford by Thomas Hopkins Gallaudet, father of Edward Miner Gallaudet, first principal of our institution and founder of the collegiate department. The institution was represented on the program and 16 members of our faculty attended the meetings.

The department has no supervision over the expenditures of the appropriation made by Congress or general supervision over the administration of the affairs of the Columbia Institution for the Deaf. The only duty devolving upon the Secretary of the Interior

in relation to this institution at this time is the reception of the annual report thereof and the admission of indigent deaf mutes of the several States and Territories to that institution for instruction in the collegiate branch thereof. Legislation should be enacted by Congress placing the control and maintenance of the Columbia Institution for the Deaf under the president and board of directors thereof and requiring them to report directly to Congress as to the administration of the institution.

MARYLAND SCHOOL FOR THE BLIND.

Section 2 of the act of Congress approved May 29, 1858 (11 Stat., 294), authorizes the Secretary of the Interior to place for instruction in an institution for the blind, in the State of Maryland or some other State, the indigent blind children of teachable age who are children of persons actually engaged in the military and naval service of the United States, and under section 4869, Revised Statutes of the United States, the blind children of teachable age belonging to the District of Columbia.

The act of May 26, 1908 (35 Stat., 295), making appropriations for the District of Columbia provided that after July 1, 1908, a contract should be entered into by the Commissioners of the District of Columbia for the instruction, in Maryland or some other State, of indigent blind children of the District, appropriated $6,000 for the purpose, and repealed the permanent indefinite appropriation under section 3689 of the Revised Statutes. Inasmuch as the Secretary of the Interior, by section 2 of the act of May 29, 1858 (11 Stat., 293), was also charged with providing for the instruction of the blind children of all persons in the military and naval service of the United States, while such persons are actually in such service, the expense to be defrayed from the permanent indefinite appropriation above referred to, the question was submitted to the Comptroller of the Treasury as to whether that appropriation was repealed so far as to be no longer available for the instruction of this class of beneficiaries. In an opinion rendered October 27, 1908, the Comptroller of the Treasury held that the act of May 26, 1908, supra, only repealed the provisions of section 3689 of the Revised Statutes to the extent that said section provides for the education of the blind children of the District of Columbia, and that the permanent indefinite appropriation in question is still available for instructing the blind children of all persons in the military and naval service of the United States, in some institution in Maryland or some other State, and that the Secretary of the Interior is authorized to continue to issue permits for the instruction of such children. No permits for this class of beneficiaries were issued during the last year.

SUPERINTENDENT OF THE UNITED STATES CAPITOL BUILDING AND GROUNDS.

In his annual report the Superintendent of the United States Capitol and Grounds states that painting and retouching have been done as needed in all of the rooms of the Supreme Court and in the corridors and toilets in that section of the Capitol, also in the Senate Chamber, the Vice President's room, Senate stationery room, Senate restaurant, guardroom, janitor's room, Senate kitchen, and in the rooms occupied by the lieutenant of police, also in the House Chamber, the Speaker's room, Ways and Means Committee room, Elections No. 2, Enrolled Bills, Railways and Canals, index room, guardroom, House restaurant, House substation, woodwork of the House kitchen, all the corridors, three toilets, and all of the committee rooms of the House terrace west side.

Among the plumbing repairs new water connections have been made to the steam table in the subbasement of the Senate wing, a 5-inch drainage sewer 200 feet in length has been laid from the freight lift with connections with the subbasement of the Supreme Court; new water pipes, heating pipes, two new lavatories, two new shower baths, and a new urinal have been installed in police rooms of the Senate terrace; two new drinking fountains installed in the main corridors of the Senate and the same number in the main corridors of the House wing; one new toilet installed in the subbasement of the Supreme Court; additional toilets and lavatories for the use of the Justices of the Supreme Court installed in the north corridor; and a new lavatory in the office of the clerk of the Supreme Court.

The electrical work at the Capitol includes the removal of the exposed wires of the legislative bell system in the terraces of the Senate and House wings of the Capitol and the substitution of a concealed circuit therefor. All of the rooms and bookshelves of the Senate library have been rewired and 110 electric-light bulbs supplied. All elevators and lifts have been overhauled and necessary repairs made. The elevator shaft of the elevator of the Supreme Court has been extended to the subbasement level. Seven hundred and fifty minor repairs have been made to fans, motors, electric wires, etc., through the electrical department, and 672 minor repairs through the shops and mechanical departments.

Concrete floors have been laid in the boiler room and in the floors adjoining the Senate lift, the police rooms of the Senate terrace, and in rooms 4 and 6 of the House terrace. To properly safeguard entrances to the Capitol, 93 manholes, coal holes, and similar openings have been fastened down with iron plates, 72 area gratings placed in position, steel gratings placed over all subway vents and air ducts, and 7 pairs of steel doors installed in various places.

On the Capitol Grounds the trees have been thoroughly sprayed and trimmed, walks and driveways repaired, the lawns seeded, sodded, and fertilized, the plant cases have been cared for, shrubbery planted and trimmed, repairs to the water and sewerage system made, and the lighting system changed from arc and incandescent lamps to modern nitrogen incandescent lamps. New lamp-posts have been supplied where necessary and 28 high-power lamps have been installed on the terrace. Six similar lights have also been placed at the east front of the Capitol and four near the John Marshall statue at the foot of the west stairways.

Statuary for the House pediment.—On August 2, 1916, the sculpture for the House pediment was unveiled with appropriate ceremonies. The sculpture is by Paul W. Bartlett and the contract price $74,000. A portrait of former Speaker Joseph G. Cannon has been placed in the Members' lobby of the House of Representatives, and a marble statue of Uriah M. Rose, presented by the State of Arkansas, and a bronze statute of Sequoyah, presented by the State of Oklahoma, placed in Statuary Hall.

Capitol power plant.—Satisfactory service has been rendered to Congress during the past year through the successful operation of this plant.

Engine house, Senate and House stables.—All of the plumbing of the House stables has been overhauled, new fixtures installed, needed repairs to doors, roofs, windows, floors, etc., made. The interior of the stables has been reconstructed for garage purposes for the use of the automobiles of the House of Representatives.

United States Botanic Garden.—Annual distribution of plants, trees, and shrubs under the authority of Congress has been carried on as usual. This service is increasing, and now reaches every State in the Union and also Hawaii. A large number of contributions to the Botanic Garden of plants, seeds, and tubers have been made. A collection of 32 hardy ferns has been purchased and planted in the rockery in front of the superintendent's office. Trees and shrubs have received their usual spring and fall spraying and the necessary pruning attended to. Greenhouse No. 5 has been completely remodeled, the roof raised, side ventilators installed, new benches constructed, new water pipe laid, and the interior and exterior given two coats of paint. The roof of the superintendent's office has been renewed as necessary and two coats of paint given the exterior. In greenhouse No. 4 a partition has been erected to prevent moisture from penetrating the adjacent wall of the residence of the superintendent. New benches have been built in this greenhouse. Permanite, a special greenhouse putty, has been used on the roof of the main conservatory, making that structure water-tight, and the entire

exterior painted. Minor repairs have been made to greenhouses, heating apparatus, and cold frames from time to time as necessary.

Courthouse, Washington, D. C.—Funds for the preservation and remodeling of this historic landmark have been supplied through appropriations by Congress. The architectural beauty of the exterior is to be restored in stone and the interior modernized and readjusted so as to provide for two additional courts, in case they are created. The work is now well started and plans for the interior agreed on. Foundations around the building have been reinforced and enlarged to receive the stone surfacing of the exterior and a part of the granite base course has been set. Main sewerage lines have been placed and duly connected. The old roof has been cut away from exterior wall lines and independently supported to permit its removal in sections and the replacing of the old roof with the new steel and concrete roof. Main steps and porticos have been taken down and new foundations placed.

In order that the reconstruction of the courthouse might not interfere with the procedure of the courts $8,000 for rental of temporary quarters and $7,500 for the removal of the courts was provided by the general deficiency bill approved September 8, 1916. Under these provisions an agreement was made by this office with the executors of the estate of M. G. Emery for the rental of a certain portion of the building at the corner of B and First Streets NW., in which space was arranged as suggested by the courts for their accommodation. All the necessary available furniture, etc., from the old courthouse was removed and installed, and the sessions of the courts in their new quarters commenced about December 1, 1916.

New dormitory for women, Columbia Institution for the Deaf.—Additional accommodation for the students of this institution was provided by an appropriation of $90,000 in the sundry civil act approved July 1, 1916. In the general deficiency bill approved September 8, 1916, a further appropriation of $53,000 was made. All important contracts have been arranged for. The greater portion of the work, however, is being carried on by the Government, contracts being made for material, the same being put in place by skilled labor employed by this office. All plumbing and electrical roughing-in work has been installed, the roof construction nearly completed, and the interior ready for plastering.

Court of Claims building.—Extensive repairs have been made to the Court of Claims building, including painting of all exterior and interior woodwork, walls of the light shafts, tin roofs and cornices, and all walls and ceilings of the rooms and offices. A new automatic elevator for the use of the judges and officers of the court has been installed, five new toilets installed, new hardwood floors laid, ceilings in the court room and office of the clerk reconstructed, passageways

built across light shafts on second floor, windows opened in light wells, new glass panel doors installed, new door frames and window sash put in place, five windows lowered, two casement windows opened in the front of the building, brick cornice of east wall relaid, a new brick wall and entrance to coal cellar built, the heating plant overhauled, and new radiators installed.

Enlarging the Capitol Grounds.—The act of August 26, 1912 (37 Stats., 594), imposes on the Secretary of the Interior the duty of renting until removed property acquired under the act of June 25, 1910 (36 Stats., 739) and supplementary acts for the enlargement of the Capitol Grounds. During the fiscal year 1917 no properties additional to those acquired during 1916 and prior years was secured. As to the properties in square 633, the title to which is in the United States, no action has yet been taken by the Superintendent of the Capitol Building and Grounds toward removing the buildings thereon, and they have accordingly been rented as far as practicable at nominal rates. During the fiscal year 1917 rents have been collected from the properties in said square and deposited in the Treasury by the chief disbursing clerk of this department, amounting in the aggregate to $1,506.

AMERICAN ANTIQUITIES.

The act of June 8, 1906, entitled "An act for the preservation of American antiquities," provides, among other things:

SEC. 3. That permits for the examination of ruins, the excavation of archæological sites, and the gathering of objects of antiquity upon the lands under their respective jurisdiction may be granted by the Secretaries of the Interior, Agriculture, and War to institutions which they may deem properly qualified to conduct such examination, excavation, or gathering, subject to such rules and regulations as they may prescribe: *Provided*, That the examinations, excavations, and gatherings are undertaken for the benefit of reputable museums, universities, colleges, or other recognized scientific or educational institutions, with a view to increasing the knowledge of such objects, and that the gatherings shall be made for permanent preservation in public museums.

SEC. 4. That the Secretaries of the departments aforesaid shall make and publish from time to time uniform rules and regulations for the purpose of carrying out the provisions of this act.

Archæological explorations.—The uniform rules and regulations promulgated by the Secretaries of the Interior, Agriculture, and War pursuant to the above-mentioned act, under date of December 28, 1906, provide (par. 3) that—

Permits for the excavation of ruins, the excavation of archæological sites, and the gathering of objects of antiquity will be granted by the respective Secretaries having jurisdiction to reputable museums, universities, colleges, or other recognized scientific or educational institutions, or to their duly authorized agents.

During the year nine permits were granted for the examination, excavation, and gathering of specimens as follows:

July 29, 1916, to Dr. Edgar L. Hewett, director of the School of American Archæology, Santa Fe, N. Mex., to conduct archæological excavations at the ruins of Puye on the Santa Clara Indian Reservation, N. Mex., including permission to camp at the ruins and collect specimens to be deposited in the State museum at Santa Fe, N. Mex.

January 15, 1917, to the Bureau of American Ethnology, of the Smithsonian Institution, and the Museum of the American Indian (Heye Foundation), of New York City, to conduct archæological excavations in and to gather collections from the historic pueblo of Hawikuh, believed to lie within the limits of the Zuni Indian Reservation, N. Mex.; collections to be deposited in the Museum of the American Indian in New York City and the United States National Museum.

March 3, 1917, to the Peabody Museum of Harvard University to conduct archæological researches and gather collections in Chin Lee Canyon and adjacent region in northeastern Arizona.

May 11, 1917, to the Museum of the American Indian (Heye Foundation) to conduct excavations and gather collections in the cliff ruins and other aboriginal remains in the Canyon de Chelly, Navajo Indian Reservation, Ariz., all work to be done under the immediate supervision of Mr. Jesse L. Nussbaum, and all collections to be deposited in the Museum of the American Indian.

May 11, 1917, to the American Museum of Natural History (Prof. P. E. Goddard, curator of ethnology) to examine the prehistoric ruins situated in the Fort Apache Indian Reservation, Ariz., collect samples of potsherds exposed, to run trial trenches through the refuse heaps usually found adjoining such ruins, and to make such minor excavations as will in no case imperil the present condition of any walls.

May 23, 1917, to the United States National Museum (represented by Dr. Walter Hough) to conduct archæological excavations and gather collections on the public domain in western Valencia and Socorro Counties, N. Mex., not included within the limits of forest reserves; all collections to be deposited in the National Museum.

June 28, 1917, to the University of Arizona, acting through Prof. Byron Cummings, to continue during the season work of archæological excavation and gathering collections in Sagie ot Sosie, Sagie, and Nitsie (Navajo Creek) Canyons, on the Navajo Indian Reservation, Ariz., and to examine the ruins situated on the public domain on the north side of the Gila River about 3 miles from Florence, Ariz.

July 31, 1917, to the United States National Museum, acting through Mr. Neil M. Judd, aid in the Division of Archæology, to

make reconnoissance of and conduct excavations and gather collections of archæological specimens, etc., on the public domain in that portion of Utah lying west of the Wasatch Mountains, or more specifically in the counties of Kane, Garfield, Millard, Tooele, and Box-elder; the material collected to be shared equally between the University of Utah and the National Museum, as the expedition was to operate jointly with the University of Utah.

October 27, 1917, to Dr. Robert F. Gilder, archæologist, University of Nebraska, to make examination and gatherings of specimens and to make preliminary reconnoissance for archæological purposes in Indian reservations and public lands in certain counties in southern Arizona.

GENERAL EDUCATION BOARD.

This corporation, which was created by the act of Congress approved January 12, 1903, section 6 of which requires the corporation to annually file with the Secretary of the Interior a report, in writing, stating in detail the property, real and personal, held by the corporation and the expenditure or other use or disposition of the same or the income thereof during the preceding year, has for its object the promotion of education within the United States. The corporation owns no real estate, its property consisting of securities and money divided into various funds, according to the purpose for which it is to be used.

On June 30, 1917, the principal funds belonging without restriction to the board amounted to $34,124,740.81, invested in stocks and bonds.

The income from the above funds, together with the income from undisbursed income, amounted during the year to $2,883,264.08. The balance of income from previous year as of June 30, 1916, amounting to $7,267,811.40, increased the total to $10,151,075.48.

Disbursements from income during the year were as follows:

Universities and colleges for whites	$1,454,538.91
Colleges and schools for whites for current expenses	2,500.00
Medical schools	350,000.00
Colleges and schools for negroes	130,486.23
Professors of secondary education	33,521.30
State agents of rural schools for whites	48,072.49
State agents of rural schools for negroes	32,331.38
Model county organization	8,025.00
Negro rural-school fund	10,000.00
County training schools for negroes	9,687.36
Home makers' clubs for negroes	19,131.89
Farm demonstration work in Maine	14,002.26
Boys' and girls' clubs in Maine	5,689.39
Farm demonstration work in New Hampshire	8,500.00
Educational investigation and research	50,019.58
Consolidated rural schools	3,500.00
Supplemental fund	4,403.12

Experimental school	$11,750.00
Washington University, interest on deferred payment	25,000.02
Lafayette College, interest on deferred payment	257.72
Administration expenses	88,358.03
Total	2,309,774.68

In addition to the above there was spent for schools from principal funds, $25,000.

This leaves an undisbursed balance of income on June 30, 1917, of $7,841,300.80. It is invested as follows: Bonds and stocks, $6,960,472.12; cash, $264,880.82; accounts receivable, $615,947.86.

It should be noted, however, that against this balance there are unpaid appropriations amounting to $7,368,679.44. It should also be noted that there is an unpaid appropriation of $60,000 chargeable against principal funds.

The John D. Rockefeller special fund is a fund which Mr. Rockefeller controls as to principal and income.

The principal of this fund, as originally received, as mentioned in a previous report, has been completely used, so that at present it is composed only of the income earned by that portion of the fund set aside for the University of Chicago which remains undelivered. The income thus earned during the year was $162,609.78. The balance from previous years ($19,176.37) makes a total of $181,786.15.

Disbursements during the year were as follows:

Gift to the Rockefeller Institute for Medical Research	$50,687.50
Expenses	572.26
Total	51,259.76

This leaves a balance of $130,526.39 in cash and receivables.

The Anna T. Jeanes fund, the income to be used for negro rural schools, amounts to $200,000. It is invested as follows: Bonds, $182,877.51; stocks, $16,645; cash, $477.49.

The income from this fund during the year was $8,220.08. Added to the balance from the previous year, the total available income amounted to $15,549.53. Of this $9,003.62 was appropriated and paid to various schools, and $23.97 paid out for expenses, leaving a balance of $6,521.94 in cash.

MARITIME CANAL CO. OF NICARAGUA.

Section 6 of the act of Congress approved February 20, 1889, entitled "An act to incorporate the Maritime Canal Co. of Nicaragua" (25 Stat., 675), provides:

Said company shall make a report on the first Monday of December in each year to the Secretary of the Interior, which shall be duly verified on oath by the president and secretary thereof, giving such detailed statement of its affairs

and of its assets and liabilities as may be required by the Secretary of the Interior, and any willfully false statements so made shall be deemed perjury and punishable as such. And it shall be the duty of the Secretary of the Interior to require such annual statement and to prescribe the form thereof and the particulars to be given thereby.

The report of this corporation when received will be duly transmitted to Congress. In view of the fact, however, that the Maritime Canal Co. of Nicaragua has no relations whatever with this department and the secretary has no duty to perform in relation thereto except as specified in the above-mentioned law, the act should be so amended as to require the corporation to submit directly to Congress such form of report as it may prescribe.

APPENDIX A.

LAND CLASSIFICATION

Land classification, with progress of coal classification and valuation.

STATUS ON JULY 1, 1916.

State.	Withdrawals outstanding.	Coal lands classified and appraised.	Valuation.	Valuation at minimum price.
	Acres.	*Acres.*		
Arkansas		60,715	$1,473,762	$1,214,280
Arizona	118,718			
California	17,643	7,720	585,086	154,404
Colorado	4,622,749	2,863,585	186,158,446	50,800,977
Idaho	338,452	2,113	51,824	42,260
Montana	11,131,717	5,445,592	128,849,832	107,587,882
Nevada	83,833	5,880	117,600	117,600
New Mexico	5,709,760	710,262	16,302,834	8,610,819
North Dakota	14,857,342	2,174,635	35,565,775	35,565,775
Oregon	4,361	6,915	122,451	89,699
South Dakota		250,123	2,758,587	2,758,587
Utah	5,426,730	1,048,542	44,081,949	14,220,707
Washington	847,255	740	16,000	14,800
Wyoming	2,777,394	7,448,456	385,444,847	112,338,577
Total	45,935,954	20,025,278	801,528,993	333,516,367

STATUS ON JULY 1, 1917.

Arkansas		60,715	1,473,762	1,214,280
Arizona	141,945			
California	17,643	7,720	585,086	154,404
Colorado	4,503,417	2,877,487	195,091,022	51,370,820
Idaho	338,452	2,113	51,824	42,260
Montana	10,912,569	5,506,779	129,698,998	108,437,048
Nevada	83,833	5,880	117,600	117,600
New Mexico	5,603,894	657,145	15,682,664	7,881,453
North Dakota	14,656,455	2,375,992	37,623,645	37,623,645
Oregon	4,361	6,875	121,651	88,899
South Dakota		250,123	2,758,587	2,758,587
Utah	5,326,256	1,057,450	44,325,419	14,311,487
Washington	827,193	1,060	22,400	21,200
Wyoming	2,437,723	7,448,096	385,436,687	112,334,977
Total	44,853,741	20,257,435	812,989,345	336,356,660

Withdrawals and restorations.

OIL LAND.

State.	Withdrawals outstanding July 1, 1916.	Fiscal year ended June 30, 1917.		Withdrawals outstanding July 1, 1917.
		Withdrawals.	Restorations.	
	Acres.	*Acres.*	*Acres.*	*Acres.*
Arizona	230,400	.....	.....	230,400
California	1,365,947	.....	108,718	1,257,229
Colorado	87,474	.....	.....	87,474
Louisiana	467,030	.....	.....	467,030
Montana	641,622	734,432	29,949	1,346,105
North Dakota	84,894	.....	.....	84,894
Utah	1,952,326	.....	.....	1,952,326
Wyoming	791,467	169,359	37,644	923,182
Total	5,621,160	903,791	176,311	6,348,640

PHOSPHATE LAND.

Florida	119,817	.....	80	119,737
Idaho	966,377	.....	.....	966,377
Montana	119,227	.....	.....	119,227
Utah	302,465	.....	.....	302,465
Wyoming	998,592	.....	.....	998,592
Total	2,506,478	.....	80	2,506,398

POTASH LAND.

California	91,207	.....	.....	91,207
Nevada	39,422	.....	.....	39,422
Total	130,629	.....	.....	130,629

MINERAL LAND.

Arizona	8,507	.....	.....	8,507

OIL SHALE LAND.

Colorado	.....	45,440	.....	45,440
Utah	.....	86,584	.....	86,584
Total	.....	132,024	.....	132,024

Metalliferous classification.

[Northern Pacific Railroad grant lands, Idaho and Montana.]

	Classified prior to July 1, 1916.	Classified during fiscal year 1916–17.	Classified June 30, 1917.
	Acres.	*Acres.*	*Acres.*
Mineral	224,218	.....	224,218
Nonmineral	334,634	160	334,794
Total	558,852	160	559,012

Miscellaneous classifications.

MINERAL AND NONMINERAL LAND.

[Lands chiefly in present and former Indian reservations.]

	Classified prior to July 1, 1916.	Classified during fiscal year 1916–17.	Classified June 30, 1917.
	Acres.	*Acres.*	*Acres.*
Mineral	185,937		185,937
Nonmineral	7,026,352		7,026,352
Total	7,212,289		7,212,289

OIL LAND.

Montana		42,097	42,097

PHOSPHATE LAND.

Idaho		4,080	4,080
Wyoming		20,576	20,576
Total		24,656	24,656

Oil shale classification.

State.	Classified prior to July 1, 1916.		Classified during fiscal year 1916.		Classified June 30, 1917.	
	Mineral.	Nonmineral.	Mineral.	Nonmineral.	Mineral.	Nonmineral.
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
Colorado	893,418		2,600		896,018	
Utah	112,950		2,527,709	[1] 4,744	2,635,915	4,744
Wyoming	460,103				460,103	
Total	1,466,471		2,530,309	4,744	3,992,036	4,744

[1] Reclassification of previous minerals.

Power sites withdrawn, restored to entry, and outstanding.

State.	Withdrawals outstanding July 1, 1916.	Fiscal year ended June 30, 1917.		Withdrawals outstanding July 1, 1917.
		Withdrawals.	Restorations.	
	Acres.	*Acres.*	*Acres.*	*Acres.*
Alabama	120			120
Alaska	69,300			69,300
Arkansas	22,354			22,354
Arizona	335,791	27,173	62,640	300,324
California	256,090	8,323	407	264,006
Colorado	273,670	3,124	290	276,504
Idaho	260,745	2,987	1,238	262,494
Michigan	1,240			1,240
Minnesota	12,309			12,309
Montana	171,891	536	8,130	164,297
Nevada	26,153	1,208		27,361
Nebraska	761			761
New Mexico	13,577	49,705	680	62,602
Oregon	261,676	56,406	764	317,318
Utah	451,217	760	4,553	447,424
Washington	108,593	5,427	240	113,780
Wyoming	87,165	704	966	86,903
Total	2,352,652	156,353	79,908	2,429,097

Public water reserves.

State	Withdrawals outstanding July 1, 1916.	Fiscal year ended June 30, 1917.		Withdrawals outstanding July 1, 1917.
		Withdrawals.	Restorations.	
	Acres.	*Acres.*	*Acres.*	*Acres.*
Arizona	9,922	2,516	.....	12,438
California	49,846	2,788	160	52,474
Colorado	480	.....	.....	480
Idaho	6,170	1,040	.....	7,210
Montana	1,040	2,264	.....	3,304
Nevada	4,336	.....	.....	4,336
New Mexico	1,440	846	.....	2,286
Oregon	2,500	160	178	2,482
Utah	33,987	.....	160	33,827
Washington	.....	40	.....	40
Wyoming	83,551	2,280	3,000	82,831
Total	193,272	11,934	3,498	201,708

Reservoir-site reserves.

State.	Withdrawals outstanding July 1, 1916.	Fiscal year ended June 30, 1917.		Withdrawals outstanding July 1, 1917.
		Withdrawals.	Restorations.	
	Acres.	*Acres.*	*Acres.*	*Acres.*
Arizona	23,040	.....	.....	23,040
Montana	9,080	.....	.....	9,080
North Dakota	1,569	.....	.....	1,569
Oregon	10,619	.....	.....	10,619
Washington	35,943	.....	.....	35,943
Total	80,251	.....	.....	80,251

Summary of enlarged-homestead designations, fiscal year 1916–17.

States.	Outstanding on July 1, 1916.	Designations during fiscal year 1916–17.	Cancellations during fiscal year 1916–17.	Outstanding on June 30, 1917.
	Acres.	*Acres.*	*Acres.*	*Acres.*
Arizona	25,125,355	213,692	.....	25,339,047
California	4,875,197	2,337,251	.....	77,212,448
Colorado	26,026,922	947,321	13,750	26,960,493
Idaho:				
Sections 1 to 5 only	9,754,609	290,901	2,833	10,042,677
Section 6	124,828	2,873	2,792	124,909
Total	9,879,437	293,774	5,625	10,167,588
Kansas	372,684	95,455	.....	468,139
Montana	48,502,807	1,018,116	678	49,520,245
Nevada	46,305,197	.....	3,445	46,301,752
New Mexico	25,468,032	3,299,319	18,895	28,748,456
North Dakota	9,560,710	1,934,493	.....	11,495,203
Oregon	17,874,712	122,082	.....	17,996,794
South Dakota	14,426,192	1,059,797	.....	15,485,989
Sections 1 to 5 only	7,150,736	374,376	38,790	7,486,322
Section 6	1,274,124	68,173	8,928	1,333,369
Total	8,424,860	442,549	47,718	8,819,691
Washington	5,196,302	250,842	.....	5,447,144
Wyoming	20,574,410	1,119,160	22,696	21,670,874
Total	262,612,817	13,133,851	112,807	275,633,861

APPENDIX B.

National parks administered by the National Park Service—National Park statistics.

[Number, 17; total area, 9,773 square miles; chronologically in order of creation.]

Name.	Location.	When established.	Area (miles).	Special characteristics.
Hot Springs Reservation.	Arkansas	Apr. 20, 1832	1½	46 hot springs possessing curative properties—Many hotels and boarding houses—20 bathhouses under public control.
Yellowstone	Wyoming, Montana, and Idaho.	Mar. 1, 1872	[1] 3,348	More geysers than in all rest of world together—Boiling springs—Mud volcanoes—Petrified forests—Grand Canyon of the Yellowstone, remarkable for gorgeous coloring—Large lakes—Waterfalls—Vast wilderness inhabited by deer, elk, bison, moose, antelope, bear, mountain sheep, etc.—Greatest wild bird and animal preserve in world.
Casa Grande Ruin.	Arizona	Mar. 2, 1889	¾	One of most noteworthy relics of prehistoric age and people within limits of United States. Discovered in 1694.
Sequoia	California	Sept. 25, 1890	252	The Big Tree National Park—12,000 sequoia trees over 10 feet in diameter, some 25 to 36 feet in diameter—Towering mountain ranges—Startling precipices.
Yosemite	do	Oct. 1, 1890	1,125	Valley of world-famed beauty—Lofty cliffs—Romantic vistas—Waterfalls of extraordinary height—3 groves of big trees—Large areas of snowy peaks—Waterwheel Falls.
General Grant	do	do	4	Created to preserve the celebrated General Grant Tree, 35 feet in diameter—6 miles from Sequoia National Park.
Mount Rainier	Washington	Mar. 2, 1899	324	Largest accessible single peak glacier system—28 glaciers, some of large size—48 square miles of glacier, 50 to 500 feet thick—Wonderful subalpine wild-flower fields.
Crater Lake	Oregon	May 22, 1902	249	Lake of extraordinary blue in crater of extinct volcano, no inlet, no outlet—Sides 1,000 feet high.
Wind Cave	Dakota	Jan. 9, 1903	16	Well known by reason of a cavern therein having many miles of galleries and numerous chambers of considerable size containing many peculiar formations.
Platt	Oklahoma	July 1, 1902	1⅓	Many sulphur and other springs of medicinal value, under Government regulation.
Sullys Hill	Dakota	Apr. 27, 1904	1¼	Small rugged hill containing prehistoric ruins—Practically a local park.
Mesa Verde	Colorado	June 29, 1906	77	Most notable and best preserved prehistoric cliff dwellings in United States, if not in the world.
Boundary changed.	do	June 30, 1913		
Glacier	Montana	May 11, 1910	1,534	Rugged mountain region of unsurpassed Alpine character—250 glacial-fed lakes of romantic beauty—60 small glaciers—Peaks of unusual shape—Precipices thousands of feet deep—Sensational scenery.
Rocky Mountain	Colorado	Jan. 26, 1915	396	Heart of the Rockies—Snowy range, peaks 11,000 to 14,250 feet altitude—Remarkable records of glacial period.
Boundary changed	do	Feb. 14, 1917		
Hawaii	Hawaiian Islands.	Aug. 1, 1916	118	Three separate areas: 2—Kilauea, continuously active for century, and Mauna Loa, altitude 13,675 (largest active volcano in world, erupting every decade)—are on Hawaii; Haleakala, on Maui, 10,000 feet high, with tremendous rift in summit 8 miles across and 3,000 feet deep; many cones, gorgeous tropical forests, mahogany groves, and lava caves; erupted 200 years ago.
Lassen Volcanic	California	Aug. 9, 1916	124	Only active volcano in United States proper—Lassen Peak, 10,465 feet in altitude—Cinder Cone, 6,879 feet—Hot springs—Mud geysers—Ice caves—Canyons—Lakes.
Mount McKinley	Alaska	Feb. 26, 1917	2,200	Highest mountain in North America—Altitude 20,300 feet—Rises higher above surrounding country than any other mountain in world.

[1] In Wyoming, 3,114 square miles; in Montana, 198 square miles; in Idaho, 36 square miles.

National monuments administered by the National Park Service.

[Number, 22; total area, 143.4 square miles; chronologically in order of creation.]

Name.	Location.	Date of proclamations.	Area (acres).	Description.
Devils Tower	Wyoming	Sept. 24, 1906	1,152	Remarkable natural rock tower, of volcanic origin, 1,200 feet in height.
Montezuma Castle	Arizona	Dec. 8, 1906	[1] 160	Prehistoric cliff-dwelling ruin of unusual size situated in a niche in face of a vertical cliff. Of scenic and ethnological interest.
El Morro	New Mexico	....do..... June 18, 1917	240	Enormous sandstone rock eroded in form of a castle, upon which inscriptions have been placed by early Spanish explorers. Contains cliff-dweller ruins. Of great historic, scenic, and ethnologic interest.
Petrified Forest	Arizona	Dec. 8, 1906 July 31, 1911	25,625	Abundance of petrified coniferous trees, one of which forms a small natural bridge. Is of great scientific interest.
Chaco Canyon	New Mexico	Mar. 11, 1907	[1] 20,629	Numerous cliff-dweller ruins, including communal houses, in good condition, and but little excavated.
Muir Woods [2]	California	Jan. 9, 1908	295	One of the most noted redwood groves in California, and was donated by Hon. William Kent, Member of Congress. Located 7 miles from San Francisco.
Pinnacles	.....do.....	Jan. 16, 1908	2,080	Many spirelike rock formations, 600 to 1,000 feet high, visible many miles; also numerous caves, and other formations.
Natural bridges	Utah	Apr. 16, 1908 Sept. 25, 1909 Feb. 11, 1916	[1] 2,740	Three natural bridges, among largest examples of their kind. Largest bridge is 222 feet high, 65 feet thick at top of arch; arch is 28 feet wide; span, 261 feet; height of span, 157 feet. Other two slightly smaller.
Lewis and Clark Cavern. [2]	Montana	May 11, 1908 May 16, 1911	160	Immense limestone cavern of great scientific interest, magnificently decorated with stalactite formations. Now closed to public because of depredations by vandals.
Tumacacori	Arizona	Sept. 15, 1908	10	Ruin of Franciscan mission dating from sixteenth century, until recent years in fair preservation, now rapidly disintegrating.
Navajo	.....do.....	Mar. 20, 1909 Mar. 14, 1912	360	Contains numerous pueblo, or cliff-dweller ruins, in good preservation.
Mukuntuweap	Utah	July 31, 1909	15,840	Magnificent gorge, depth from 800 to 2,000 feet, with precipitous walls of gorgeous coloring. Of great beauty and scenic interest.
Shoshone Cavern	Wyoming	Sept. 21, 1909	210	Cavern of considerable extent, near Cody.
Gran Quivira	New Mexico	Nov. 1, 1909	[1] 160	One of the most important of earliest Spanish mission ruins in the Southwest. Monument also contains Pueblo ruins.
Sitka	Alaska	Mar. 23, 1910	[1] 57	Park of great natural beauty, and historic interest as scene of massacre of Russians by Indians. Contains 16 totem poles of best native workmanship.
Rainbow Bridge	Utah	May 30, 1910	160	Unique natural bridge of great scientific interest and symmetry. Height 309 feet above water, and span is 278 feet, in shape of rainbow.
Colorado	Colorado	May 24, 1911	13,883	Many lofty monoliths, and is wonderful example of erosion, and of great scenic beauty and interest.
Papago Saguaro	Arizona	Jan. 31, 1914	2,050	Splendid collection of characteristic desert flora and numerous pictographs. Interesting rock formations.
Dinosaur	Utah	Oct. 4, 1915	80	Deposits of fossil remains of prehistoric animal life of great scientific interest.
Sieur de Monts [2]	Maine	July 8, 1916	[1] 5,000	Mountainous area adjacent to Bar Harbor which includes 10 mountains and several lakes. Is very wild and rugged. Most romantic and beautiful mingling of mountain and ocean scenery on Atlantic coast.
Capulin Mountain	New Mexico	Aug. 9, 1916	681	Cinder cone of geologically recent formation.
Verendrye	North Dakota	June 29, 1917	253	Includes Crowhigh Butte, from which Explorer Verendrye first beheld territory beyond the Missouri River.

[1] Estimated area.

[2] Donated to the United States.

National monuments administered by the Department of Agriculture.

[Number 11; total area, 1,754 square miles; chronologically in order of creation.]

Name.	Location.	Date of creation.	Area (acres).	Description.
Gila Cliff Dwellings.	New Mexico...	Nov. 16, 1907	160	Numerous cliff-dweller ruins of much interest and in good preservation.
Tonto	Arizona	Dec. 19, 1907	[1] 640	Do.
Grand Canyon	....do	Jan. 11, 1908	[1] 806,400	Includes the most wonderful portion of the Grand Canyon of the Colorado.
Jewel Cave	South Dakota.	Feb. 7, 1908	[1] 1,280	Limestone cavern of much beauty and considerable extent, limits of which are as yet unknown.
Wheeler	Colorado	Dec. 7, 1908	300	Of much interest from geological standpoint as example of eccentric erosion and extinct volcanic action. Of much scenic beauty.
Mount Olympus	Washington...	Mar. 2, 1909 Apr. 17, 1912 May 11, 1915	299,370	Contains many objects of great and unusual scientific interest, including many glaciers. Is summer range and breeding ground of the Olympic elk.
Oregon Caves	Oregon	July 12, 1909	480	Extensive caves in limestone formation of much beauty; magnitude not entirely ascertained.
Devil Postpile	California	July 6, 1911	800	Spectacular mass of hexagonal basaltic columns, like an immense pile of posts. Said to rank with famous Giant's Causeway in Ireland.
Walnut Canyon	Arizona	Nov. 30, 1915	960	Contains cliff dwellings of much scientific and popular interest.
Bandelier	New Mexico...	Feb. 11, 1916	22,075	Vast numbers of cliff-dweller ruins, with artificial caves, stone sculpture, and other relics of prehistoric life.
Old Kasaan	Alaska	Oct. 25, 1916	38.3	Abandoned Indian village in which there are numerous remarkable totem poles and other objects of historical interest.

[1] Estimated.

National monuments administered by the War Department.

Number, 2; total area, 6 acres; chronologically in order of creation.]

Names.	Location.	Date of creation.	Area (acres).	Description.
Big Hole Battle Field.	Montana	June 23, 1910	5	Site of battle field on which battle was fought Aug. 9, 1877, between a small force of United States troops and a much larger force of Nez Perce Indians, resulting in rout for the Indians.
Cabrillo	California	Oct. 14, 1913	1	Of historic interest because of discovery of the territory now partly embraced in the State of California by Juan Rodriguez Cabrillo, who at this point first sighted land on Sept. 28, 1542.

REPORT OF THE COMMISSIONER OF THE GENERAL LAND OFFICE.

REPORT OF THE COMMISSIONER OF THE GENERAL LAND OFFICE.

DEPARTMENT OF THE INTERIOR,
GENERAL LAND OFFICE,
Washington, September 17, 1917.

SIR: I have the honor to submit a report of the transactions of business in the General Land Office for the fiscal year ended June 30, 1917, together with my suggestions as to new legislation.

AREA OF LAND ENTERED AND PATENTED.

The total area of public and Indian lands originally entered and allowed during the fiscal year ended June 30, 1917, is 16,201,794.38 acres, not including 240,158.67 acres embraced in finals not heretofore counted as original dispositions of land. This latter area is constituted as follows: Public auction, 180,844.05 acres; abandoned military reservations, 1,767.88 acres; cash and private sales, individual claimants and small-holding claims, 32,586.80 acres; preemption entries, 221.40 acres; and soldiers' additional homesteads, 24,738.54 acres. The area of 16,201,794.38 acres is a decrease of 2,841,358.54 acres, as compared with the area originally entered and allowed during the fiscal year 1916.

The area patented during the fiscal year is 11,313,362.24 acres, a decrease of 848,445.75 acres, as compared with the fiscal year 1916. Of the above area, 7,544,055.27 acres were patented under the homestead laws, a decrease of 179,682.96 acres, not including as homesteads 22,464.50 acres patented as soldiers' additional entries.

CASH RECEIPTS AND EXPENDITURES.

The total cash receipts from the sales of public lands, including fees and commissions, and sales of Government property for the fiscal year 1917 were $3,632,192.89 (1916, $3,428,588.20), an increase of $203,604.69. The total receipts from sales of Indian lands were $2,445,582.52 (1916, $2,000,516.17). Other receipts aggregated $71,855.13. The total receipts of this bureau during the fiscal year 1917 were $6,149,630.54, as against $5,470,466.81 for the preceding fiscal year, an increase of $679,163.73.

The total expenses of district land offices for salaries and commissions of registers and receivers and incidental expenses during the fiscal year ended June 30, 1917, were $863,224.66, an increase of $33,033.67 over the preceding fiscal year. The aggregate expenditures and estimated liabilities of the public-land service, including expenses of district land offices and surveys made from the appropriations for surveying the public lands outside of railroad land-grant limits, were $2,959,801.24, leaving a net surplus of $3,189,829.30 of receipts over expenditures. Disbursements from the following special deposit trust funds and reimbursable appropriations are not included in the above figures as receipts or expenditures: From deposits by individuals for surveying the public lands, $179,962.67; from surveying within land grants (reimbursable), $74,792.82; from opening Indian reservations (reimbursable), $14,572.13; from surveying and allotting Indian reservations (reimbursable) for surveying, $33,938.26; and from proceeds of labor, Oklahoma Cherokees, $88.62.

THE FIELD SERVICE.

The sum made available for the Field Service for this year was the same as last year, namely, $475,000. The average number of field employees maintained under this appropriation during the year was 108, and in addition thereto the cost of the maintenance of offices of the chiefs of Field Division and the clerical assistance required for them was paid from this appropriation.

The total amount of cash collected and turned into the Treasury as the result of the work of the field force during the fiscal year was $109,656.02; of this amount, $43,485.96 was in settlement of timber trespass cases and $12,860.43 was secured from timber sales; $53,309.63 was recovered through civil and criminal action brought by the Department of Justice in cases of depredations on the public lands and violations of the public-land laws. In addition, there has been turned into the Treasury $11,491.07, which represents royalty on coal mined during the past year from a tract in Colorado. This tract has been patented, but title thereto was recovered through suit, and under the decree of the court the lessee from those deriving title from the patentee was protected, and the Government therefore now stands, while this lease runs, in the position of lessor.

As a result of investigations by the field employees, 115,488.64 acres have been restored to the public domain. Of this amount 103,680 acres represent fraudulent entries (taking an average of 160 acres to each entry) canceled through proceedings based upon special agents' reports; 11,808.64 acres were restored to open range by abatement of unlawful inclosures without suit.

Special agents have investigated and reported on 20,728 cases, 4,619 of which were adversely and 16,109 favorably reported. Two hundred and fourteen hearings in Government contest cases have been held.

Civil suits in 133 cases were recommended to the Department of Justice as the result of investigations made during the year. Two hundred and forty civil suits were tried in court, of which 113 were won and 127 lost. As the result of the successful prosecution of these suits $50,773.88 was recovered and 14,408.85 acres were restored to the public domain, of which 8,616 had been unlawfully inclosed.

Of the criminal cases tried during the year 19 resulted in conviction, under which there were 10 prison sentences imposed and fines amounting to $3,135.75. At the close of the year there were 356 civil cases and 150 cases wherein criminal prosecution was recommended pending in the Department of Justice.

An additional class of investigations has been placed upon the Field Service by reason of the provision for stock driveways contained in the act of December 29, 1916, known as the stockraising homestead act. A large number of applications for driveways have already been received and this situation is being looked into by the field force. Several reports have already been made and some temporary withdrawals have been recommended and made as the result. This class of investigations is very important for the reason that not only must the interests of the stockmen be considered but also those of the individual settler and the community at large.

It is interesting to note that while the average number of agents employed during the fiscal year was but two more than for the preceding year, the number of cases closed was over 2,300 more than last year.

The national crisis has already affected, to some extent, the Field Service force. Two of the employees have received commisisons in the Officers' Reserve Corps and have been called to the colors. It is probable that a number of others will be taken from the force, as there have been a number of applications filed for admission to the officers' training camps.

THE OIL LAND SITUATION.

The general interest of the country in the oil land situation, especially in California and Wyoming, justifies a statement of the pertinent facts with respect thereto, with the legal questions pending in the courts, and before the department.

As to the matter of proceedings now pending, there are in the main three general classes: (1) Land Office hearings on Government contests against applications for patent; (2) what are commonly

known as the withdrawal suits in the courts to quiet title in the Government to unpatented lands, for an accounting and damages, with ancillary receiverships, and (3) what are commonly known as the Southern Pacific suits, which are to cancel patents for alleged frauds committed in the acquirement of title.

It should be noted at the outset that the Southern Pacific suits, the third class, have no connection whatever with the withdrawal suits, the facts, principles, and issues all being entirely different. The fraud alleged in the Southern Pacific suits is that the lands were all of known mineral character, and so known to the Southern Pacific officers and agents at the time the company filed and received approval and patent of its selection list. In all of these Southern Pacific suits except one an important question of law is involved, in that the fraud was not discovered or suits filed for more than six years after the issuance of patent. One suit, commonly known as the Elk Hills case, involving 6,109.17 acres, was commenced before the statute had run. This case was won by the Government in the trial court and is now pending on appeal. The evidence in the other Southern Pacific cases, eight in number, and embracing 163,654.09 acres, has practically all been taken. Some of the lands involved in the Southern Pacific suits are among the most valuable oil lands in California, and the suits involve many millions of dollars.

Coming to the so-called withdrawal cases, classes 1 and 2, it is first to be noted that some years ago practically all the known public oil lands were withdrawn from entry and selection "in aid of proposed legislation affecting the use and disposition of the petroleum deposits on the public domain." The two principal withdrawal orders around which the present controversy hangs were made on September 27, 1909, and July 2, 1910, both covering substantially the same lands. The effect of the first withdrawal order was to cut off everything but valid, perfected, legal claims. At this time there was great activity in certain sections in the location, development, and exploitation of new fields. Manifestly this order caught the claimants in every conceivable stage of development, from those who had only a "paper location" to those who had drilled nearly to oil. In this connection there was not a little argument and difference of opinion as to the validity of this withdrawal order of September 27, 1909, and some of the lower courts held that the order was without authority of law and void, but the Supreme Court of the United States, in February, 1915, settled the question in what was known as the Midwest case, holding that the order was lawful, valid, and effective.

In the meantime, however, Congress took a hand in the matter, and on June 25, 1910, the so-called Pickett Act was approved. The principal purpose of this act was to remove any doubt as to the au-

thority of the President to make withdrawals by expressly giving him that authority. At the instance of the oil men, who complained that they had been treated unfairly, in that they had been taken unawares after the expenditure of large sums on the basis of the then existing laws and conditions, a proviso was inserted to the effect that "a bona fide occupant or claimant" who at the date of any withdrawal order "heretofore or hereafter made" was in diligent prosecution of work leading to discovery, and continued same with diligence, would not be affected by the withdrawal; but Congress expressly disclaimed any intention of validating or invalidating the withdrawal theretofore made, i. e., that of September 27, 1909.

So the whole question, so far as the effect of the withdrawals is concerned, is: Was the claim perfected by the discovery of oil before the withdrawal; and if not, was the claimant in diligent prosecution of work leading to discovery on that date, which diligence was continued to discovery, and, incidentally, of course, what constitutes diligence under all the varied and complicated facts and circumstances of the many cases that have arisen, for it now appears probable that hundreds of thousands of dollars have been expended in the development of immensely valuable properties not covered or saved by the proviso to the Pickett Act.

Another feature of the withdrawal matter is that of the naval petroleum reserves. By order of September 2, 1912, the President created naval petroleum reserve No. 1, commonly known as the Elk Hills, consisting of a gross area of a little over 38,000 acres; by order of December 11, 1912, the President created naval reserve No. 2, sometimes referred to as the Buena Vista Hills, and covering a little over 29,500 acres; by order of April 30, 1915, naval reserve No. 3, the Teapot Dome, in Wyoming, was created, embracing 9,481 acres. Large portions of naval reserves Nos. 1 and 2, in California, are private patented lands; naval reserve No. 2 contains some of the most valuable producing oil lands in California. The so-called Elk Hills suit against the Southern Pacific Co. includes a considerable area in the Elk Hills naval reserve. It should be understood that all the land included in these naval reserves was also included in the orders of withdrawal of September 27, 1909, and July 2, 1910. The creation of the naval reserves only operates to set aside these areas for the exclusive use of the Navy. While the principles of law and the right to a patent on claims situated in the naval reserves are essentially the same as those situated in withdrawn areas outside of the naval reserves, due to the fact that the Navy has been desirous of immediately clearing the naval reserves of all doubtful claims, a somewhat different policy has been followed in the naval reserves from that outside. There are no patented lands in naval reserve No. 3, in Wyoming, though there is a small area of school sections.

Injected into this oil-land situation in many cases is the issue of fraud, resulting from so-called dummy locators. This issue, of course, has no connection with the withdrawal policy and would have existed in any case regardless of the withdrawals. The placer-mining law provides that a person may locate a claim of 20 acres, and that an association of persons up to eight may locate a claim equal to 20 acres for each locator; hence the great majority of the locations consist of 160-acre claims located by associations of eight persons. The courts and the department during recent years have repeatedly held that each locator in an association claim must have an actual bona fide interest in the claim located, and that he can not simply lend his name as a locator for the use and benefit of somebody else. A corporation may locate any number of claims of 20 acres each, but a group of association locators can not locate a claim for the use and benefit of a corporation or individual. The advantage of the association location is that only one discovery and the same amount of expenditure for patent is required on each claim, whether it be a 20-acre claim or a 160-acre claim. A corporation whose title is now bad because based on a location made by dummies might have acquired a perfectly legal title to the land in question by locating it in 20-acre claims by making a discovery on each. It is possible that in the absence of the intervening withdrawals these defective locations might be abandoned and proper locations made. The fraud in the use of dummies consists in one individual or corporation by this device seeking to acquire a larger area of public lands with a certain amount of expenditure and development than the law allows. Unfortunately, the use of dummy locators appears to have been quite generally resorted to, and dummy locations are void, at least as to all those connected with or benefiting by the fraud.

Another class of cases consists of those where the charge is non-discovery by reason of the fact that the alleged discovery on which the location is predicated consists of gypsum or fuller's earth. This difficulty would also have existed just the same regardless of the withdrawals, except that in the absence of the withdrawal a proper and legal discovery of oil might later be made.

The proceedings directed in all the Land Office hearings against the applications for patent in the oil land cases consist, therefore, of three general classes: (1) Diligence of the claimant as against the withdrawal; (2) fictitious locators; and (3) alleged subterfuge discovery.

In cases in the naval reserves and some outside, suits have been started to quiet title in the Government or for an accounting and damages, notwithstanding applications for patent are pending, also, some other suits have been brought against claimants who have never

made any application for patent. These are the suits that are commonly known as the withdrawal suits as distinguished from the Southern Pacific suits.

No one not directly connected with the handling of these matters can comprehend the immense amount of work and multitude of details that has had to be examined in the investigation and preparation of all these cases.

As soon as the Government began actively to press these cases, operators who were producing oil from the lands found it difficult to sell same because the purchasing concerns refused to incur any liability for damage which might result from having purchased oil taken in trespass. Consequently Congress, by the act of August 25, 1914, authorized the Secretary of the Interior to enter into agreements whereby the production could go on pending the determination of the right to title. Under this act security is given, or a certain portion of the proceeds of the oil is impounded, to satisfy any claims of the Government. Under these various agreements escrow deposits and security aggregating over $1,500,000 have been made.

It is manifest that the situation above outlined is in many respects unfortunate, both as regards the oil operators affected and the interests of the Government, as well as the general public. Congress has given much attention during the past four years to proposed oil-land legislation. The Secretary of the Interior has consistently recommended the enactment of a general leasing system whereby the oil business may be placed on a rational basis, with certain tenure to the operator and proper control by the Government. Very naturally, in connection with all of the proposed legislation there have been presented for consideration the claims for "relief" of those whose properties are involved in the litigation referred to. The problem in Congress, then, is to harmonize conflicting views on questions of general legislative policy with respect to this tremendously valuable national resource and to adjust these various claims and equities in such a way as to protect the interests of the Government, do justice to the operators, put an end to long and expensive litigation, place the oil business on a sound, practical basis, and render possible the increase at this critical time of the production of a commodity that has come to be a necessity of our modern civilization.

A statement in detail as to the condition outlined as above follows:

CALIFORNIA.

Investigations of cases in the withdrawn field have proceeded satisfactorily during the year. All of the cases which have been pending for any length of time have been investigated, and whenever new applications are filed examinations are being made promptly and

reports submitted. The holding of hearings on those cases against which adverse proceedings had been ordered has not proceeded as rapidly as I had hoped. This was due in a considerable measure to the fact that a number of the agents and mineral examiners were engaged in cooperation with the Department of Justice in the investigation and prosecution of cases in suit and thus were not available as witnesses in Land Office hearings, and for the further reason that in a number of instances there were cases in suit involving some of the questions which were raised in the Land Office proceedings, and it was thought advisable to secure an adjudication in the former. However, plans for bringing most of these cases to hearings in the immediate future have been prepared, and these cases will be tried in a short time before the proper local land officers.

During the year 46 trespass suits and suits to quiet title in the Government, for accounting, etc., were brought, involving an acreage of 7,700.77. Decisions in favor of the Government have been rendered in 6 cases, involving 960 acres; adverse decisions have been rendered in 4 cases, involving 1,120 acres. The total number of suits now pending in which decision is to be rendered is 55, involving 10,100.77 acres.

For the purpose of setting forth the situation involving these lands in California in a specific way, I am giving the following statistics:

The total acreage in the withdrawn area is now 1,252,166, 108,948 acres having been restored during the year. Of this, about 862,000 acres are patented; 34,206.36 acres are in pending mineral entries; about 8,400 acres are embraced in agricultural entries; and about 348,000 acres are vacant or embraced in entries under the act of July 17, 1914. Of the 140 pending mineral applications, adverse proceedings have been directed against 99, involving 24,850.88 acres; in 28 cases, embracing 4,434.84 acres, the proceedings are on the dummy charge; in 22 cases, with an acreage of 6,125.15, the charge has been made that the claimants had not made a discovery or were not in diligent prosecution of work leading thereto at the date of withdrawal; in 39 cases, covering 11,434.37 acres, the proceedings are on both the dummy and withdrawal charges; and in 10 cases, involving 2,851.52 acres, there are other charges, principally absence of discovery. Hearings have been had in 6 cases, involving 901.73 acres, and these 6 cases are now pending either in the General Land Office or the department in different stages of action.

As to the cases involving lands in naval reserves, there are two entries covering 961.68 acres involved in private contests; 7 entries with an acreage of 1,758.96 are involved in adverse suits under section 2326 of the Revised Statutes; 13 entries for 3,326.79 acres are pending

action on reports of special agents; and in 7 cases, with an acreage of 1,090.21, we are awaiting reports.

Seven cases in naval reserve No. 1 are pending on adverse proceedings and 20 in naval reserve No. 2. The figures given above regarding adverse proceedings include those in naval reserves.

The following statistics relative to the trespass suits may be of interest:

In naval reserve No. 1 there are two pending suits, involving 320 acres; in naval reserve No. 2 46 suits, involving 8,184.49 acres; a total of 48 suits, with an acreage of 8,508.49. Outside of the naval reserves there are 23 suits, involving 4,598.91 acres. The total of oil trespass suits in California is 71 and the acreage 13,107.40.

WYOMING.

Additional oil withdrawals of 165,421 acres have been made in Wyoming in the past year, and 32,701 acres have been restored as nonoil, leaving 934,295 acres embraced within existing withdrawals on June 30, 1917. There has been little change in the situation in the State so far as pending oil land applications are concerned. During the year one entry of 160 acres was patented and seven applications embracing 840 acres were rejected. One new application of 160 acres was filed. At the end of the fiscal year 59 applications for patent, embracing 9,220 acres, were pending.

No new suits were instituted during the year; one suit covering 160 acres is pending, and adverse proceedings were ordered against the application for patent involved and hearing held thereon before the register and receiver. Under a stipulation with the Department of Justice operations are being conducted on the land and a portion of the proceeds from the sale of the oil are being deposited in escrow pending the outcome of the suit.

In October, 1916, the case of the United States against the Ohio Oil Co. et al., involving 240 acres of proven oil land in the Grass Creek field, was decided against the Government by the circuit court of appeals, and in December a motion for rehearing was denied. This is the first case in which an appellate court has passed on the question of diligent prosecution of work under the act of June 25, 1910. In its decision the court stated:

> In our opinion when a citizen of the United States in good faith enters upon public land for the purpose of discovering oil or gas, takes possession of the land by placing a caretaker thereon while he is taking proper steps to obtain the material necessary for the work of constructing the camps, enters into contracts for drilling, acting as expeditiously as possible in erecting camps and preparing for the drilling, spends money and enters into contracts whereby he becomes liable for sums of money to prosecute the work leading to the discovery

of oil or gas, and as soon as it is possible, by the exercise of proper diligence, begins the work of drilling and continues it diligently and expeditiously until oil is discovered in commercial quantities, he is within the protection of this proviso.

The court of appeals did not pass on the question of the claimed shallow discoveries, which had also been decided adversely to the Government in the district court.

OIL CONTRACTS.

At the present time there are 48 contracts under the act of August 25, 1914 (38 Stat., 708), pending in California, embracing 4,160 acres. Twelve of these contracts are supplemental, providing for disposition of proceeds impounded prior to the entering into of the original contracts. The production on the tracts covered by these contracts up to June 30, 1917, was 2,963,143.47 net barrels; the escrow deposits arising under these contracts amount to $217,352.54.

In Wyoming there are 25 such contracts, covering an acreage of 6,330. This includes five contracts in which, instead of a deposit in escrow, surety bonds covering an agreed maximum liability have been filed. The production under these contracts up to the end of the fiscal year was 5,547,788 net barrels. All these contracts are in the Salt Creek field.

In the Grass Creek oil field there are two 40-acre tracts which are being operated under State leases and are not included in mineral applications, so that contracts under the act referred to could not be made, but an understanding has been entered into whereby the gross proceeds less a certain amount allowed for operating expenses are impounded pending determination of the State's title to the lands. From the lands covered by these two agreements have been produced up to the end of the fiscal year 443,908.47 barrels, and the escrow deposits arising from the operations amount to $500,996.50, which makes a total production in Wyoming under these various agreements of 5,991,343.47 barrels, and of escrow deposits, or its equivalent (surety bonds), $1,302,570.67. The grand total of both the California and Wyoming production is 8,954,486.84 net barrels and $1,519,923.21 escrow deposits.

When the campaign for subscriptions to the liberty loan was on arrangements were entered into with the operators in Wyoming whereby the amounts in escrow under these contracts might be used for the purchase of liberty bonds. As a result, subscriptions amounting to about $750,000 were entered.

In the Salt Creek field in Wyoming all of the production in the withdrawn area on unpatented lands is being conducted under permits under the act of August 25, 1914 (38 Stat., 708), with one exception—that is the case in suit in which operations are being con-

ducted under an arrangement between the operator and the Department of Justice, which is in the nature of a receivership.

In California all of the lands outside the naval reserves and those in entries in suits are, with the exception of a few tracts, embraced in these temporary contracts. As to some of those not now embraced in these contracts, assurances have been given that contracts will be promptly filed, and as to the others suits have been or will be recommended.

All unpatented producing oil lands in naval reserve No. 2, consisting of 51 quarter sections, are involved in suits. There are no unpatented producing oil lands in naval reserve No. 1, the wells that have been drilled through the oil sands on that reserve having been capped.

The approximate acreage of lands patented to the Southern Pacific Railroad Co. involved in litigation is 156,000, exclusive of the six thousand and odd acres involved in what is known as the Elk Hills case, in which the Government has secured a favorable decree from the district court.

There are 4,760.51 acres involved in suits, in which receivers have been appointed.

Approximately 10,500,000 barrels of oil have been produced from unpatented lands involved in suits under the control of a receiver since his appointment; the average daily production from such lands is 12,500 barrels.

Approximately $6,500,000 in money and oil worth approximately $1,500,000 are now in the receiver's hands.

One suit in Wyoming is pending on an agreement under which about one-half of the proceeds are deposited in bank in the name of the Attorney General to await the outcome of the litigation. Under this agreement, there has been deposited the sum of $76,163.

"FERRY" OR "CADDO LAKE" OIL LANDS IN LOUISIANA.

During the past fiscal year the Government has adopted a definite course with reference to the action which it intends to pursue in the case involving certain oil-land areas within so-called "Ferry" or "Caddo Lake," in Caddo Parish, La. The title to the lake area has been a mooted question for a number of years. The lake, as shown upon plats and maps, was approximately 20 miles long by 15 miles wide in its greatest extent, and was situated in northwestern Louisiana and northeastern Texas. That portion of the lake area which was involved in the case pending before the land department is situated in T. 20 N., R. 16 W., L. M., Louisiana. At the date of the original survey of said township 7,089.80 acres were surveyed and 10,605.26 acres were shown as a portion of the lake. At the time

that the case involving the question of title was initiated there were extensive areas within the so-called lake area which were not covered with water, and the question arose as to whether or not the lake area, or any part of it, belongs to the Government. After exhaustive investigations and careful consideration of all of the evidence obtainable upon the subject the General Land Office came to the conclusion that the whole so-called lake area belongs to the Government, on the ground that it was not such a permanent body of water at the date of the original survey of the township in 1839, or at the date of the admission of the State of Louisiana in 1812, as to entitle the State to possession of it by virtue of her sovereignty.

Rich deposits of oil were discovered within the so-called lake area in T. 20 N., R. 16 W., during the period that the case was pending; and, in view of the fact that it would be necessary, should the Government assert title to the lake area, for the Department of Justice to institute suit to quiet title to the lands and to recover for the oil extracted therefrom, the Secretary of the Interior certified the case to the Attorney General with the request that appropriate action be taken by his department should he deem that the law and facts warranted the Government in asserting title to the lands.

During the field investigations it was definitely determined that there were certain areas of high lands bordering on the mean high-water level of the lake at the date of the original survey of the township that were omitted from the survey. It was also determined that there were considerable areas of lands which had been uncovered by the waters of the lake subsequent to the date of the original survey. The Acting Attorney General rendered an opinion in which he concluded that the unsurveyed high-land areas which were situated above the mean high-water level of the lake at the date of the original survey—about 617 acres—belong to the Government, and that it should take appropriate action to recover possession of those lands and the value of the oil extracted therefrom. He further concluded that either the lake was a permanent body of water, navigable at the date of the admission of Louisiana to statehood, and that that portion of it which was situated below the mean high-water level of the lake at the date of the admission of the State—about 9,988 acres—belongs to the State by virtue of her sovereignty; or that the said area was swamp land at the date of the swamp-land grant made in favor of the State, and that it would be entitled to take the land under that grant.

The opinion of the Acting Attorney General has since been followed by the Land Department, and during the past year the unsurveyed high lands above the mean high-water level of the lake at the time of the original survey have been surveyed and supplemental plats of the township were approved on March 28, 1917.

All of the public lands within certain townships, including T. 20 N., R. 16 W., Louisiana, were withdrawn from entry or disposition on December 15, 1908, and were placed within Louisiana petroleum reserve No. 4 by Executive order issued July 2, 1910. Those lands are not, therefore, subject to disposition, except under the provisions of the act of July 17, 1914 (38 Stat., 509), entitled "An act to provide for agricultural entry of lands withdrawn, classified or reported as containing phosphate, nitrate, potash, oil, gas, or asphaltic minerals," under the terms of which the minerals are reserved to the United States.

At the time that the investigations were made within the lake area a number of oil companies were operating. The lands which the State was claiming had been leased to the Gulf Refining Co. That company and a number of other smaller companies were also extracting oil from the unsurveyed high-land areas bordering on the lake. It was estimated that approximately between four and five million dollars' worth of oil had been extracted from the entire lake area, and that perhaps $750,000 worth of oil had been taken from the unsurveyed high lands. As above indicated, no action is to be taken with a view to recovering for the value of any of the oil extracted from the lands claimed by the State. Eighteen suits have, however, been recently instituted by the Government in the United States District Court for the Western District of Louisiana, with a view to recovering the value of the oil extracted from the formerly unsurveyed high lands. The Government contends that there were no existing valid claims upon any of those lands at the date of the withdrawal of December 15, 1908, and that those who extracted oil from those lands are trespassers.

"THE SUNK LANDS" AND "LAKE LANDS" IN ARKANSAS.

The subject pertaining to the status of the so-called "sunk lands" and "lake lands" in Arkansas has been described to such an extent in previous annual reports that it might be said to be one of common knowledge among those interested in public-land matters. However, notwithstanding the fact that much work has been done in the past, there still remains much to be done.

The legal status is practically the same as it was at the date of the previous annual report. The suit of Lee Wilson & Co. against the United States (see 214 Fed., 614, and 227 Fed., 827), the test case upon which the Land Department has based its action in other cases involving questions of title to these lands, is still pending before the United States Supreme Court. It is expected that a decision will be rendered by that court early during the forthcoming October term.

The suits involving the question of title to the areas locally known as "Carson," "Hickory," and "Tyronza" Lakes are still pending in

the United States district court. The Government is endeavoring, by virtue of those suits, not only to quiet the title to 8,800 acres of so-called lake lands, but also to recover for the timber alleged to have been cut in trespass therefrom.

The Attorney General has directed that suits be instituted with the view to quieting title in the Government to the areas locally known as "St. Francis River sunk lands," "Big Lake," "Round Lake," "Bagwells Lake," and "Tyronza Cut-off." The bills are now being prepared, and they include prayers for accounting for the use of whatever timber was cut in trespass by the parties claiming adversely to the Government. The areas of these lands aggregate upwards of 75,000 acres. The so-called "St. Francis River sunk lands" extend a distance of 40 miles along the St. Francis River. A great amount of field work has been done during the past fiscal year by the agents of the Land Department for the purpose of enabling the Government to institute these suits. The investigation of the "St. Francis River sunk lands" area has been completed and the reports have been prepared.

On August 2, 1917, decisions were rendered by the Land Department in which the title to certain lands within the areas of so-called "Golden Lake" in Ts. 10 and 11 N., Rs. 9 and 10 E., and in that portion of "Pemisco Bayou" which is situated in Secs. 21 and 28, Ts. 16 N., R. 12 E., was held to be vested in the Government, and on August 16, 1917, a similar decision was rendered with reference to certain lands within the area of so-called "Swan Lake" in Secs. 25 and 36, T. 10 N., R. 8 E., and Secs. 30 and 31, T. 10 N., R. 9 E. There are approximately 5,000 acres within the area of so-called "Golden Lake," and it is estimated that at least three-fifths of that area is comprised of lands which were in place at the date of the original survey. The areas involved in the other two decisions aggregate about 800 or 900 acres. The survey of these lands has been directed and will probably be made during the next surveying season.

Cases involving the question of title to lands within the areas of so-called "Youngs," "Carters," "Cypress," "Dismal," "Hudgins," and "Mills" Lakes are still pending before the Land Department. Decisions in those cases will be rendered during the coming fiscal year. The preparation of decisions in the later cases of this class requires more time than was necessary in the early cases. The Land Department was permitted in the earlier cases to render decisions without contest on the part of the adverse claimants. They elected to waive preliminary hearings and have the courts decide the question of title without regard to any action taken by the Land Department. When the courts sustained the Land Department the adverse claimants changed their attitude in the later cases and employed

able attorneys to represent them at the hearings in order that they might win, if possible, before the tribunal which first assumed jurisdiction. The result has been that the evidence has been quite voluminous, and the issues of fact (the issues of law have become quite settled) have been sharply contested. In many instances the testimony is conflicting, and must therefore be weighed very carefully.

In order that the Government's interests in the above-mentioned lands may not be prejudiced by having the title of the lands which it is claiming pass into the hands of private parties, the issuance of final certificates and patents has been suspended until the question of title shall have been finally adjudicated by the courts, or until it shall have been determined that the institution of further suits is unnecessary. The entrymen are, however, permitted to perfect and submit their final proofs and do everything required of them to be entitled to patents. During the past year 152 final proofs have been received, examined, and found satisfactory. Patents will doubtless be issued to those entrymen as soon as the suits shall have been decided, provided that the contentions of the Government are sustained by the courts.

On July 27, 1916 (39 Stat., 409), Congress included in the rivers and harbors appropriation an item for the purpose of making a preliminary examination and survey with a view to ascertaining the practicability of improving the St. Francis River sunk lands in the States of Arkansas and Missouri and of incidentally reclaiming by drainage the contiguous lands.

On April 13, 1917, an Executive order was issued withdrawing all of the then vacant public lands within certain enumerated townships, including those townships within which the so-called "St. Francis sunk lands" are situated.

Under the terms of the withdrawal order the rights of the entrymen who had entered the lands prior to the date of the withdrawal and are complying with the homestead laws were not affected thereby. Should the examination which is being made by the United States Army engineers show that it is feasible for the Government to expend the necessary funds for improving the St. Francis River and reclaiming the adjoining lands, the vacant public lands, after the improvements shall have been completed, will doubtless be restored to entry, subject to the imposition of a drainage tax to be paid by the entrymen for defraying the expenses of making the improvements. There are large areas of public lands adjacent to the St. Francis River which are subject to inundation and periodical overflow, which in their present condition are practically worthless for agricultural purposes, but which will become very valuable for those purposes if properly drained.

STOCK DRIVEWAYS.

By section 10 of the stock-raising homestead act of December 29, 1916 (39 Stat., 862), the Secretary of the Interior is authorized, in his discretion, to withdraw from entry lands necessary to insure access by the public to reserved watering places and needed for use in the movement of stock to summer and winter ranges or to shipping points, and certain limitations are prescribed for the driveways which may be withdrawn thereunder.

Numerous recommendations from the Forest Service and applications from stockmen and others for withdrawal of lands as stock driveways in the range States have been received, followed in many instances by protests from other residents and prospective homesteaders under the 640-acre provisions of the act. Such recommendations and applications are under departmental instructions considered by this office. Investigation by the field force of this office is now in progress to ascertain the public needs in respect to stock driveways and to consult also other proper interests involved. These investigations have increased very materially the work of the field divisions during the last six months of the fiscal year.

Based on such investigations, certain areas, amounting to 136,291 acres, in eastern Oregon were withdrawn from all disposition on April 12, 1917, pending determination as to the necessity and advisability of reserving the lands as stock driveways; and by order of July 23, 1917, several driveways were reserved in southern Colorado in connection with the San Isabel National Forest, aggregating 6,670 acres, the reservation being subject to prior valid claims initiated under the public-land laws other than the act of December 29, 1916, and legally maintained. Prior to the enactment of the act of December 29, 1916, certain lands in central Arizona were temporarily withdrawn by Executive order of September 30, 1916, under the act of June 25, 1910 (36 Stat., 847), for stock driveway purposes, having an aggregate area of 329,050 acres. Modification of such withdrawal to conform to the limitations of the act of December 29, 1916, is under consideration.

SURVEYS.

ACCEPTED SURVEYS.

The year just closed finds the field survey organization in very creditable condition and the surveying season of 1917 fairly launched with prospects of a successful campaign, the only drawback being the uncertainty of the status of the personnel, owing to the military preparations now under way and the calling of men to the colors. Instructions were duly issued at the opening of the season for authorized surveys and parties were equipped and sent into the field,

notwithstanding this handicap and that of the increased cost of all kinds of supplies.

The total acreage of both surveys and resurveys was 10,205,111; over 1,000,000 acres were found incomplete in minor particulars and required revision by the surveyors general before formal acceptance, which reduces the total approved surveys by about that amount.

The assistance of nine examiners detailed for two months resulted in a reduction of arrearages from five months to about three and one-half months in the office examination of surveys. The record of accepted surveys indicates that Montana stood at the head, with a total of 2,643,518 acres; the State nearest approaching this is Arizona, with 1,006,885 acres. Nebraska resurveys, amounting to 1,220,-029 acres in 1916, tops the record for accepted resurveys in any one district in the history of the division of surveys; and the grand total of nearly 3,000,000 acres accepted resurveys indicates a degree of activity in these complicated operations never before attained.

RESURVEYS.

This branch of the surveying service is assuming such proportions by reason of the increasing demands of those interested that in the States of Colorado, Wyoming, and Nebraska it has been found necessary to allot considerable sums to satisfy the requests for resurveys; this is shown by the total approved resurveys this year of 2,917,871 acres. The aggregate of allotments for these States reaches the 20 per cent of the appropriation for surveys and resurveys, a limit fixed by joint resolution of June 25, 1910 (36 Stat., 884), amending the act of March 3, 1909, and May 29, 1908 (35 Stat., 465), and leaves no provision for resurveys in other districts.

As stated in my last report, regulations have been formulated with a view to authorizing for resurvey only those lands upon which the ancient surveys have left few traces and where the result of a resurvey will not materially affect the lines of claims with valuable improvements thereon.

The expense of a preliminary investigation by a United States surveyor to ascertain the condition of the original surveys is found to be well worth while, as the surveyor will ascertain and recommend which method for resurvey is the best to adopt, the dependent method, restoring the original points for corners, or the independent method of segregating patented claims by a metes-and-bounds survey, or a combination of both methods, thus insuring a satisfactory resurvey, and special instructions to such surveyor may be intelligently prepared before he takes the field.

In order to meet a growing demand for resurveys in cases where the title to the greater portion of the lands is vested in private ownership, it is recommended that legislation be enacted whereby upon

the application of the owners of three-fourths of the privately owned lands in any township covered by public-land surveys, more than 50 per cent of the area of which township is privately owned, accompanied by a deposit of the proportionate estimated cost, inclusive of the necessary office work, of the resurvey or retracement of all the privately owned lands in said township, the Commissioner of the General Land Office, subject to the supervisory authority of the Secretary of the Interior, shall be authorized in his discretion to cause to be made a resurvey or retracement of the lines of said township.

DETAIL OF SURVEYORS TO WASHINGTON.

In the deficiency bill approved April 17, 1917, there was granted this office authority to detail a number of skilled surveyors from the field to assist in the final office inspection of returns sent here by the surveyors general for acceptance, preparatory to filing. As the passage of the appropriation bill was delayed on account of the expiration of the session on March 4, until April 17, 1917, and as the privilege of the detail extended only to June 30, 1917, the services of the nine surveyors selected were only available for about two months, so that their assistance, though valuable, did not clear off the arrearage of five months. We did, however, reduce them so that the time of waiting for consideration is about three and one-half months. A similar provision for the employment of the field men in the sundry civil bill for 1918 failed to be incorporated in the bill, and I was unable to continue their services beyond the end of the last fiscal year. I have asked in the estimates for 1919 that a repetition of the proviso be inserted in one of the appropriation bills, so that during the winter months or off season the surveyors can better be spared for the purpose. The necessity for this legislation must be apparent. The returns of surveys and resurveys have accumulated by reason of increased activity in the field, and the adoption of methods which secure quicker results both in the field and the surveyors general's offices, and a correspondingly large increase in the output. No increase of force in the surveying division of this office has been provided to meet and handle this accumulation and the settlers on unsurveyed lands are naturally impatient at the delay in the filing of the plats, for they know that the surveyors have completed the field work.

STATE BOUNDARY LINES.

Attention is again called to the necessity of re-marking certain State boundary lines, and I recommend that Congress be asked to appropriate the funds for this purpose.

The oblique boundary between California and Nevada, long since recognized by the legislatures of the two States as properly located by the Coast and Geodetic Survey and adopted for jurisdictional purposes, has never been connected with the system of public-land surveys through which it passes, nor has the line been monumented by mile corners suitably marked so as to be readily distinguished. In order to do this and close the public-land lines thereto, I estimated the sum of $33,000 several years ago. This estimate, because of the increase of the cost of supplies, should be changed to $40,000.

The north boundary of California and the south boundary of Colorado require to be retraced and remonumented by conspicuous and durable mile corners upon the lines of latitude as originally fixed by United States surveyors. During the execution of the work the States should be represented and the relocation confirmed bv their legislatures.

COST OF SURVEYS.

Much attention during the past three years has been given to the matter of systematizing and working out a uniformity of procedure and comparison of costs in the offices of surveyors general, with very satisfactory results. The first consolidated work report of surveyors general, showing amount and cost of all business transacted, will be found in the appendix.

The record for the last year of expenditures in connection with the field work shows an increase in the average cost per acre. The rate was found to reach 10 and 12 cents in very difficult regions remote from the railroads heavily timbered and mountainous, besides involving the use of pack animals. These surveys are not the kind usually authorized upon application of settlers, but are railroad-limit lands surveyed under the "compulsory" act which requires all the land within railroad limit to be surveyed, regardless of the character of the soil or surface, and thus lands left unsurveyed originally because of little value are surveyed at a considerable increase of expense over that of settlers' land. The heavy increase in the cost of supplies necessary for subsistence and transportation is another element in the advance in the cost. In consequence, the average rate for all districts during the year reached the high figure of 7 cents per acre.

FRAGMENTARY SURVEYS.

Among the larger cases completed in the field and returns filed before the close of the fiscal year may be mentioned: (1) In Arkansas, in T. 12 N., R. 8 E., the survey of 694 acres erroneously omitted from the original survey; in the town of Lake City the survey of 25 village lots provided for under special act of Congress;

and along the St. Francis River special topographic surveys and maps for use in the pending suit to quiet the Government's title to approximately 50,450 acres of the so-called "sunk lands." (2) In Florida, in T. 30 S., R. 26 E., and T. 20 S., R. 27 E., the survey of 308 acres of upland erroneously omitted from the original surveys; and on the Atlantic coast at the mouth of the St. Johns River the survey of the "Batton Island" abandoned military reservation, embracing 1,110 acres. (3) In Louisiana, the survey of 617 acres of upland in T. 20 N., R. 16 W., erroneously omitted from the original survey, in accordance with the departmental decision in the Ferry Lake case, embracing valuable mineral deposits in the Caddo oil field. (4) In Michigan, the meander survey of Cass Lake in T. 2 N., R. 9 E.; this lake is a large permanent body of water not previously meandered. (5) In Minnesota, the survey of 171 acres of upland in T. 149 N., R. 40 W., erroneously omitted from the original survey. (6) In Mississippi, in T. 8 N., R. 21 W., the survey of 235 acres bordering the Pearl River, erroneously omitted from the original survey. (7) In North Dakota, the survey of the Sanish Townsite, 307 acres, on the Fort Berthold Indian Reservation; and in T. 138 N., R. 74 W., the survey of 409 acres accruing to unpatented lands by the recession of the waters of Long Lake. (8) In Wisconsin, the survey of three tracts of land within the limits of the city of Prairie du Chien, not heretofore subdivided. Completed returns were also filed covering 14 small islands in Alabama, Michigan, Minnesota, and Oklahoma, not heretofore surveyed, also several small miscellaneous tracts in North Dakota and Wisconsin.

Considerable additional work was accomplished in the field, mostly late in the fiscal year, the returns of which are in course of preparation. Among these cases may be mentioned: (1) In Florida, a limited corrective resurvey of Tps. 36, 37, and 38 S., R. 30 E., required on account of the erroneous representations of the original township plats; the survey of a large body of upland between the meander and shore line of Lake Pierce; and the survey of the "Virginia Key" abandoned military reservation. (2) In Louisiana, the survey of the "Fort Sabine" abandoned military reservation, embracing about 12,000 acres. (3) In Arkansas, Florida, Minnesota, and Wisconsin, the survey of 34 islands; in South Dakota and Wisconsin, the survey of a number of small mission tracts on several Indian Reservations; and in Iowa, the survey of a very valuable strip of land fronting on the Mississippi River within the original limits of the city of Burlington, not heretofore properly represented on the official townsite plat.

At the close of the fiscal year field work was in progress in the former Kiowa, Comanche, and Apache Indian Reservations, in Oklahoma, in response to numerous applications for the reduction of area

on account of erosion of lands along the Red, North Fork of Red, and Canadian Rivers, between the dates of the original survey (early seventies) and the sale of the unallotted lands in 1913. Preparations were complete for beginning the resurvey and remarking of the allotment corners on the Leech Lake, Cass Lake, Chippewa, Winnibigoshish, and White Oak Point Indian Reservations in Minnesota. The latter work is being undertaken at the request of the Indian Office owing to the difficulty experienced by the local authorities in identifying the original surveys for purposes of building roads along section lines, fencing the allotments, etc., and other general improvements. The original allotment surveys on the Grand Portage Indian Reservation, in Minnesota, have been continued by two field parties during the past season, and were in progress at the close of the fiscal year, with a report from the surveyors that the field work would be completed about August 15, 1917. The usual amount of other new general fragmentary work was pending at the close of the fiscal year, involving cases covered by recent departmental decisions, which will be taken up expeditiously with a view to keeping this class of work current.

SURVEY OF INDIAN LANDS.

The survey of Indian lands has continued under the plan adopted during the last fiscal year by having the surveys executed under the supervision of the general organization and returns prepared by the surveyors general. These surveys are executed upon the request of the Commissioner of Indian Affairs, under the provisions of section 2115, Revised Statutes, and under this practice field work has been undertaken on the White Mountain Apache Reservation in Arizona, Los Coyotes in California, Southern Ute in Colorado, Jicarilla in New Mexico, Warm Springs and Umatilla in Oregon, and the Kalispel and Lummi Reservations in Washington. Field work has also been continued on the San Domingo and Cochiti Pueblos, N. Mex.

Town sites on the following reservations have been subdivided: Yellow Bay, Flathead, Montana, Inchelium, Colville, Washington, and addition to Duchesne, Uintah, Utah. Provision has also been made for the subdivision of Pablo and Tabor town sites on the Flathead Reservation, Mont.

SURVEYS OF ALASKA.

Public land surveys of areas in Alaska suitable for agricultural purposes were executed during the fiscal year 1917 under our policy of expansion of the rectangular net, in accordance with the requirements, both present and prospective, of settlement and industrial development, in the Tanana Valley, near the confluence of the

Tanana and Nenana Rivers, under the Fairbanks base and meridian, and in the Valley of the Susitna, east of the river and in the region between Knik Arm and Turnagain Arm west of the foothills, under the Seward base and meridian.

In the Tanana Valley the public land surveys initiated in the early summer of 1916 from the triangulation station, about 2 miles north of the town site of Nenana, were further extended during the fiscal year northerly and southerly across the Tanana and up the valley of the Nenana River over areas suitable for agriculture along the line of the Government railroad. During the last few weeks of the fiscal year these surveys were resumed and are being expanded by a double party, with a view to eventually connecting the group of rectangular surveys at the mouth of the Nenana River with the surveys of the Nenana coal fields.

The rectangular system of surveys in the vicinity of Knik Arm was further extended by a double party during the fiscal year northwesterly over agricultural areas along the line of the Government railroad to the Susitna River and up the east side of the valley between the river and the foothills to the Kashwitna River. Further surveys northerly are in process of execution this season.

In the region between Turnagain Arm and Knik Arm and the foothills to the east, which is as well adapted in soil, climate, and topography for agricultural purposes as any of the lands in the Cook Inlet district now settled upon, and whose value will be enhanced by the coming of the railroad, whose line traverses this district, public land surveys were completed in extent sufficient to embrace practically all lands for which there is apt to be demand in the near future.

In the early summer, toward the close of the fiscal year, arrangements were made to extend the public land surveys this season to the northern shore of Kachemak Bay, on the Kenai Peninsula. This part of the country, while not on the line of the Government railroad, nor indeed tributary to it, is entitled, by reason of its natural advantages and the interest it is creating among settlers, to every consideration in the matter of survey.

TOWN SITES.

During the fiscal year the survey of the town site of Nenana, on the south bank of the Tanana, east of the mouth of the Nenana River, which had been commenced in the early summer, was completed, as was also the railroad reserve adjacent thereto.

In the Cook Inlet district, under the Seward base and meridian, a third addition to the town site of Anchorage and a right of way elimination therein were surveyed. Also the town sites of Matanuska, at the junction of the Matanuska branch of the Government railroad

with the main line; the town site of Wasilla, on the main line of the railroad in T. 17 N., R. 1 W.; and the town site of Moose Creek, in the northeastern part of T. 18 N., R. 2 E., were laid out on legal subdivisions of the public-land surveys.

Surveys in connection with the boundaries of other town sites in the Territory were made at Petersburg, in southeastern Alaska, and Graehl, under the Fairbanks base and meridian.

EXAMINATIONS, SPECIAL SURVEYS, AND INDIAN ALLOTMENTS.

Sixty-five examinations of isolated surveys were made during the year, principally on the Alaska Peninsula. Two special surveys of school reserves, one at Tanana and the other at Fort Yukon, the preliminary survey of the Pioneer Home at Sitka, and the survey of the Ben Fox Indian allotment near Haines, in southeastern Alaska, were completed this season prior to June 30, 1917.

RECOMMENDATIONS.

As Alaska becomes better known through settlement, development, and exploration, the more apparent becomes the magnitude and variety of its natural wealth. The unique southern and southeastern coast, with its "inside passage" and protected harbors, has afforded exceptional opportunity for favorable development of her fisheries and of the resources of the coastal range. Her navigable rivers have placed a vast territory in the interior, much of which is suitable for agricultural purposes, in touch with the markets of the world, and her Government trails and wagon roads and private railroads, although limited in extent, have contributed in no small degree to the furtherance of such forms of activity as may be found along their routes. And yet there still remain enormous areas in the interior beyond the limits of the beaten paths of travel which undoubtedly, in the course of time, will by reason of their natural wealth compel attention in the matter of transportation facilities and of other forms of development.

By far the most promising of these hitherto remote and but little known districts is now being opened through the agency of the Government railroad between Seward on the south coast and Fairbanks in the interior. Perhaps every form of native wealth of which Alaska can boast is to be found along the line of or in territory tributary to this road. The agricultural possibilities of the Cook Inlet region and the Susitna Valley are well known. The Matanuska coal field, reached by a branch from the main line, is one of the most important coal fields in the Territory. In the interior the Alaska Range, in the vicinity of Broad Pass, through which the railroad will be constructed, gives promise of increased mining activity with

the advent of transportation facilities. North of the Alaska Range the railroad will traverse the Nenana coal fields, the fertile valleys of the Nenana and Tanana Rivers, and be within easy reach of the gold-mining camps in the Fairbanks district. It is over this great area that the Land Office survey is being extended as rapidly as settlement and other forms of development require. Surveys of agricultural areas in the vicinity of Seward and Fairbanks were begun several years ago and each year have been added to as long as there was necessity therefor. Large areas on the Kenai Peninsula, in the Cook Inlet country, to the north thereof in the Susitna Valley, and the Matanuska coal fields, all under the Seward base and meridian, have been surveyed. It is obvious that this extensive system of contiguous surveys should be farther extended up the valley of the Susitna on both sides of the river and over the valleys of such tributary streams as possess agricultural value. Surveys should also be extended next season to other agricultural areas on the Kenai Peninsula, especially along the northern shore of Kachemak Bay and the eastern shore of Cook Inlet. Under the Fairbanks base and meridian the survey group of the Nenana coal fields and that at the confluence of the Nenana and Tanana Rivers are rapidly approaching one another and should meet by the end of this season. The rectangular net should then be extended along the line of the railroad toward Fairbanks with a view to eventually connecting the Nenana and Fairbanks groups of surveys, and both up and down the Tanana River as settlement requires. In addition to group surveys of the areas indicated, the surveys of isolated homesteads and Indian allotments, as well as of town sites along the line of the railroad, should be kept current with the demand.

The normal allotment to Alaska from the appropriation for surveying the public lands should be sufficient to meet the requirements of survey as they are now understood.

In this connection I desire to reiterate my recommendation of a year ago that provision be made for the survey of homestead entries on unsurveyed lands in Alaska by and at the expense of the Government, under such conditions as will restrict such surveys to bona fide settlement claims.

ALASKA COAL-LEASING LAW.

By the act of October 20, 1914 (38 Stat., 741), the Secretary of the Interior was authorized and directed to survey the coal lands in the Territory of Alaska, giving preference in the order of survey to the Bering River, Matanuska, and Nenana coal fields, and to divide the unreserved surveyed coal lands into leasing blocks or tracts and offer the same for lease, and to award leases thereof through such plan as he may adopt, either by advertisement, competitive bidding, or other-

wise. The known coal areas of the Bering River and Matanuska fields were surveyed in 1915 and divided, the former into 60 leasing units, comprising a total of 33,890 acres, and the latter into 19 leasing units, comprising a total of 14,020 acres. Out of these lands, 4,356.98 acres in the Bering River and 3,326.17 acres in the Matanuska field were reserved by Executive proclamation, pursuant to the provisions of said act.

Regulations governing coal-land leases in the Territory of Alaska under said act were approved May 18, 1916. Under these regulations applications to lease the unreserved lands in these fields were received from June 1 to August 1, 1916, and during this period there were six applications filed to lease lands in the Matanuska field and two applications to lease lands in the Bering River field. One of the applications for lands in the Matanuska field was subsequently withdrawn by the applicant, leaving five in that and two in the Bering River field. Notice of the seven pending applications was published for 30 days, beginning October 10, 1916. No applications were received during the publication period; but thereafter, and before action had been taken on the pending applications, two additional applications for lands in the Matanuska field were filed. All the pending applications were transmitted to you on January 5, 1917, with report and concurring recommendations of the Bureau of Mines and this office as to the award of leases thereunder.

Awards of leases have been made under three of the applications, all for lands in the Matanuska field, viz: Block 7, 600 acres, authorized January 5, 1917; blocks 2 and 3, 1,400 acres; and blocks 10 and 11, 1,440 acres; authorized February 1, 1917. These comprise an area of 3,440 acres, with a proposed total minimum investment of $364,000 in mining operations upon the lands. The rentals for the first year, amounting to $860, have been paid by the three applicants. Mining operations on the lands leased were promptly begun by the lessees of block 7 and blocks 2 and 3, but the applicant to lease the other lands has been, at his request, granted an extension of time for executing the lease and beginning mining operations. The Alaska engineering commission has taken over the lease of block 7, and the mine is now being operated by the commission to supply coal for its own use, in connection with the construction of the Government railroad. No award of lease has been authorized under any of the other applications.

Of those for lands in the Matanuska field, one was withdrawn by the applicant after submission to you and before further action taken, and favorable action was not taken on the other three applications.

By Executive order of June 18, 1917, the tract designated as block 12, Matanuska field, containing 480 acres, was reserved, making a

total of 3,806.17 acres reserved by the President in that field. Exclusive of this reserved area and 3,440 acres for which leases have been authorized, there remains subject to lease a total of 10,100 acres of coal lands in the Matanuska field, divided into 13 blocks or tracts. The Government railroad from Anchorage, on the Knik Arm of Cook Inlet up the Matanuska River to the mouth of Chickaloon River, will furnish transportation from the center of this field to tidewater. In view of the transportation facilities thus provided, the low rentals and royalties authorized by the leasing law, and the demand for coal in Alaska and the Pacific Coast States there is opportunity in this field for large investments in coal-mining operations with reasonable assurances of satisfactory returns, and early development of these coals may be confidently expected. Investigations of the field by practical coal-mining men looking for new mining enterprises should be encouraged as much as possible. The coal is needed, and I believe there is a market for all that can be produced from this field.

No final action has been taken on the applications for leases in the Bering River field. The problem of transportation must be worked out before there can be any substantial progress in coal mining in this field.

The coal lands of the Nenana field are now surveyed and divided into leasing units, and will be opened to leasing offers as soon as it can be determined what lands should be reserved for the use of the Government and due provision made therefor. The coal deposits at Nenana, it is believed, will afford an ample supply for the Government railroad and the Fairbanks district, but it is not likely that coal from this field will find its way to the seacoast trade for some time, if ever, due to the cost of transportation.

By your order of April 12, 1917, Mr. A. Christensen, of Anchorage, Alaska, was appointed representative of the Secretary of the Interior, charged with the duties of supervising operations and performing other functions imposed by law in connection with the operations under leases made.

By your order of February 1, 1917, the Commissioner of the General Land Office, or officer designated by him, was authorized to receive all moneys paid as royalties and rentals under leases made and deposit the same in the Treasury of the United States as provided by the law, pursuant to which I designated, on March 14, 1917, the receivers of the United States land offices in Alaska to receive such moneys as may become due for rentals and royalties from lands in their respective districts after leases are executed.

Certain amendments of the form of lease prescribed by the regulations have been considered and made; and consideration has been given to the matter of amending the regulations in respect to the

proceedings to be taken on applications to lease, but no change has been made. It is recommended that amendment thereof be made so as to minimize as much as possible the office procedure required preliminary to making an award when application to lease is filed in those cases where a field has once been opened and offered to lease.

The transportation problem is one that lies at the very foundation of our difficulties in developing the coal fields of the territory. It is now believed that we have in sight in the Matanuska field, coal deposits, either under lease or operated by the Alaskan engineering commission, sufficient to supply the needs of the Government railroad as well as that portion of the Territory dependent upon Seward and Anchorage, while the field about to be opened in Nenana will ultimately provide a similar supply from the Fairbanks district.

A coal supply, however, not dependent upon railroad transportation may be secured for the coast trade from several deposits that are at the present time unsurveyed and therefore not in a condition to be offered under the leasing law.

At Chignik Bay, about 600 miles southwest of Seward, Alaska, on the south side of the Alaska peninsula and again at Herendeen Bay, on the north side of the peninsula and about 100 miles further southwest, are coal deposits that have been more or less heretofore exploited, but no official surveys thereof have been made. The information at hand, however, justifies the conclusion that these fields contain an ample supply of coal for the coastwise and fishery trade and should be utilized without further delay.

No provision for national contingencies can properly be made that overlook the possible necessities of using coal where oil is now contemplated. Not only the interests of the Territory are involved in this matter, but it may be that our failure to act when action would be effective may have serious consequences in the present conflict that promises to call for the use of all national resources.

DRAFTING.

The copper plates for 1918 map of the United States, now in course of revision, will contain a new inset of the Virgin Islands (Danish West Indies), recently acquired from Denmark by purchase.

There has been an increasing demand by bureaus of the Government for the United States map printed in black and blue only for use in delineating thereon their various activities.

New maps of Alaska (former edition 1909) and Iowa (former edition 1885) have been issued during the year, and a map of Montana has been completed and will soon be issued. Maps of Arizona, North and South Dakota, Oregon, and Washington are in course of compilation, revision, and tracing.

Much time has been taken up by the drafting force in preparation of maps for use in opening of Indian reservations and in the preparation of necessary diagrams for use in connection with intricate problems in surveying and legal propositions.

The space provided for the drafting division in the new building has permitted of an arrangement whereby the records are accessible and readily located.

The increase in necessary reproduction of the original township plats of survey from 400 in 1912 to 800 in 1917, under the annual appropriation of $5,000, has curtailed the reproduction of the old plats of surveys, so that many demands for copies can not be supplied except by rectigraph copies, or by tracing, at an increased cost over the price for photolithographic copies.

TRACT BOOK NOTATIONS.

The total number of tract book notations for the present year was 356,745, as compared with 394,307 during the previous year. This falling off was due largely to moving the records of the Land Office from our old quarters to the new Interior Department Building and the increased number of notations necessary in the posting of petitions for designation under the 640-acre stock-raising homestead law. The total number of notations includes 19,373 of these petitions, 53,424 patents, and 2,618 Indian allotments.

The number of plats posted was 2,067, as compared with 1,952 during the previous year.

PRELIMINARY EXAMINATIONS.

Homesteads, desert entries, timber and stone applications, etc., given a preliminary examination as to their validity totaled 71,448 cases, of which 61,045 were passed, the remainder requiring other action because of conflicts, or on account of defects in the evidence relative to the rights of applicants, or to the preparation of papers.

SUPPLEMENTAL PATENTS.

Supplemental patents were issued during the year under the act of April 14, 1914 (38 Stat., 335), in 2,673 cases; during the year previous 1,120 such patents were issued. These supplemental patents are provided for under the statute above cited, in cases where the original patent contained reservation of coal to the United States, but the lands were subsequently reclassified as noncoal in character.

HOMESTEAD AND KINDRED ENTRIES.

The number of cases of all kinds approved for patenting is 34,085, against 36,178 of the previous year. Of this number 30,829 are homesteads, 2,179 commuted, 28,314 under the three and five year

homestead law, and 336 under the forest homestead act of June 11, 1906.

Under the second homestead law of September 5, 1914 (38 Stat., 712), there were 5,179 applications acted upon. Of this number 4,184 were accepted, the remainder being disposed of by denial or by calling for additional evidence.

Under the act of March 4, 1915 (38 Stat., 1162), granting preference rights to petitioners under the enlarged homestead act for lands theretofore undesignated, 22,909 petitions have been received, as against 17,041 of the previous year.

THE STOCK-RAISING HOMESTEAD ACT.

Probably the most important and far-reaching land legislation that has been enacted for many years is the act of December 29, 1916 (Public No. 290), known as the stock-raising homestead act. This legislation was the subject of much controversy, extended committee hearings, and difference of opinion before its enactment; the administration and execution of the act has already presented numerous important questions and will doubtless present many more as work under the act is only started. In a broad and general way the larger cattle and sheep raising interests were opposed to this legislation, while the legislation was supported by those who believed that the remaining public lands would be better utilized by breaking them up into many small ranch homes. The stockmen contended for a leasing or permit system for the regulation of grazing on the public lands something after the manner of the method now employed in the national forests; they argued that large areas of the remaining public lands which would be taken up under a section homestead law were of such an arid character that 640 acres would not support a family; that any attempt to do so would only result in failure and in a depreciation of the value of the range as now used. On the other hand, those in favor of the stock-raising homestead pointed out the results of the operation of the enlarged homestead and of the so-called Kinkaid homestead law in Nebraska, urging that under such legislation the country would produce an equal or greater supply of meat, with numerous other products, and at the same time afford self-supporting homes for many families and render the lands ultimately subject to taxation by the States. The latter view prevailed in Congress.

Briefly, the law provides for a 640-acre stock-raising homestead on lands theretofore designated by the Secretary of the Interior as "chiefly valuable for grazing and raising forage crops, do not contain merchantable timber, are not susceptible of irrigation from any known source of water supply, and are of such character that 640 acres are reasonably required for the support of a family." Resi-

dence and a habitable house are required the same as any other homestead, but permanent improvements to the value of $1.25 per acre are required in lieu of cultivation. The act provides for additional entries of lands contiguous to the original up to 640 acres for both, provided both consist of designated lands; such additional entries may be made before or after patent on the original. The act also provides for a second entry within 20 miles from the original, the area of both entries not to exceed 640 acres, and if insufficient land of the required character is available adjoining or within 20 miles of the original entry same may be relinquished or reconveyed to the Government and a new entry made in the same land district. The act further provides for preference rights to enter the lands adjoining by those who already have entries of less than 640 acres of designated lands. We have therefore to deal with under this act designations, preference rights, second entries, two forms of additional entries, and exchange rights. The difficulties, complications, and details of administering a law of this character are quite apparent. In addition to the above the act provides for the withdrawal of lands needed for public stock-watering places and for driveways for stock. Unlike any former legislation, the act provides for a universal reservation to the Government of all minerals, wherefore mineral lands are subject to entry under the act without the necessity of classifications or hearings to determine known mineral character.

The immediate activity under this act in the way of applications and filings was unprecedented in the history of public-land legislation. In round numbers, within four months after the law had been enacted gross filings to the number of 60,000 had been made, embracing an area of some 24,000,000 acres. Of course these filings were duplications in many instances either because of conflicting claims or because of the withdrawal of one filing to make room for another, but even allowing for all these duplications the area filed on is enormous. It should be borne in mind that these filings commenced immediately after the enactment of the law before any instructions or regulations had been issued. The law specifically provides that applications may be made before designation of the land and suspended to await designation, and that in the meantime and until the application is allowed no right to occupy such lands shall be acquired by the applicant. Thus close to $1,500,000 in fees and commissions accumulated in the unearned accounts of receivers. While Congress provided for the designation of these lands, it did not provide the funds with which to make the necessary field examinations as a basis of designation until some months afterwards, the field forces for that purpose having been organized by the Geological Survey just prior to the close of the fiscal year. At the close of the year, therefore, we are in the condition of having great numbers of applications and

petitions for designations suspended in the local offices and this office without opportunity of taking further action thereon until the work of designation is under way. This has resulted in complications, and in some cases in hardship. It is reported that many of these homesteaders immediately on making their filings proceeded to take up their residence on the land not realizing that the law specifically provided that they had no right on the land until after allowance of their applications, and that the allowance of the application was entirely contingent on the designation of the land or the nonwithdrawal thereof for a stock driveway or water hole. The situation above described has been given considerable attention in Congress, and legislation has been proposed either to designate the land outright by law or to provide for the allowance of the entries subject to future contest or to insure the designation of the lands within a limited period. It is hoped that the work of designation now well started will pave the way for reasonably prompt disposition of this great number of applications, but it should be understood that any intelligent designation of the great areas covered is a task of no small dimensions and that the adjudication of the cases, involving, as it will, examination of both original and final entries in many instances, must necessarily require a tremendous amount of detail work. At the best, the disposition of the work under this act, unless a very large force is provided, is certain to be delayed.

The matter of the designation of stock driveways is referred to in another part of this report. Suffice it to say here that this feature of the legislation has been the subject of no little controversy and difference of opinion, some urging that the creation of very extensive driveways is absolutely necessary to the perpetuation of the stock-raising industry, while others urge that large driveways are unnecessary and will only operate to withdraw desirable lands from entry. The office has determined that there is only one way to dispose of this driveway situation, and that is to hear all interests and to make a careful investigation in the field of all areas to be withdrawn.

On the whole, while there are bound to be difficulties in the administration of this act, and while during the period of readjustment there may be some decrease in the meat production, I believe that ultimately this legislation will prove beneficial and lead to a better and fuller utilization of the remaining public domain. It is too early yet either to condemn it or to predict its entire success. At any rate it is clear to anybody at all familiar with the public grazing-land situation that either legislation of this character, designed to place the remaining grazing lands in private ownership, or legislation which would provide for some form of regulation of the use of the grazing areas was absolutely necessary.

SOLDIERS' ADDITIONAL HOMESTEAD RIGHTS, KNOWN IN THE MARKET AS SOLDIERS' SCRIP.

These rights, under sections 2306 and 2307 of the Revised Statutes, which the department held to be personal and applicable only to perfected entries, were held by the Supreme Court in Webster *v.* Luther (163 U. S., 331), May 18, 1896, to be assignable without restriction, whether the original entries were perfected or abandoned.

This ruling brought about an immense increase in the number of applications to locate these rights, which were thereby given the character and value of scrip, and were purchased from the soldiers, their widows, legal representatives, and heirs, by scrip dealers for a very small part of the ultimate price obtained by the dealers from the locators. Unusual activity of these dealers in the year 1916 in hunting up such rights still held by the soldiers and other beneficiaries resulted in greatly increasing the work of this office, 5,828 letters being received during the fiscal year ending June 30, 1917, 40 per cent of which being letters of inquiry from soldiers, their widows or heirs.

On July 1, 1916, there were pending 443 cases. During the fiscal year there were received 674 cases and 586 cases were disposed of by issue of patents and final rejections, so that there are now (July 1, 1917) pending 531 cases. Very many of the new cases include small fractional rights, there were 933 rights involved in the 674 cases received during the year.

The adjudication of these cases becomes more complex and difficult with the lapse of time. Sometimes one application for a 40-acre tract involves from two to nine fraction rights and requires as much work in its adjudication as so many individual cases. Nearly all the pending cases are awaiting outside action either of the applicants, the Field Service, or the Geological Survey, so that the work is practically current.

On February 15, 1917, the Secretary of the Interior made an administrative ruling which caused many material changes in the adjudication of the cases. The Secretary held that although the right is assignable, it does not follow that it is descendible, and he accordingly decided that the use of the right must be confined to the beneficiaries thereof stated in the law, namely (1) by the soldier himself during his lifetime, or (2) by his widow while her status as his widow continued, or (3) by his minor children during minority; and if not so used that it lapses and ceases to exist and never becomes an asset of the estate of the soldier, widow, or child, but that this construction would not in operation be treated as retroactive.

PREEMPTION ENTRIES.

The preemption laws, generally, were repealed by the act of March 3, 1891 (26 Stat., 1095), since which date preemption entries have been restricted to certain ceded Indian reservations, the disposition of whose lands was provided for by treaty. The two largest such areas are in the ceded Ute Reservation in western and southwestern Colorado, and in the ceded Osage Reservation in southern Kansas.

Prior to the repeal of the preemption law the preemption work constituted by far the most voluminous work of the office, but it has since been gradually reduced until only a small portion of one clerk's time is required to dispose of the entries. The records show that 137 preemption entries were made during the fiscal year ending June 30, 1917. A great many preemption declaratory statements are filed which never ripen into entry.

RECLAMATION.

During the past year farm-unit plats of 36 townships in the Salt River and Yuma irrigation projects in Arizona were approved and filed, and public notices were issued announcing the availability of a water supply for the irrigation of the land shown on these plats. Nearly all entries in these projects were made prior to the enactment of the act of June 25, 1910 (36 Stat., 835), for tracts ranging from 80 to 160 acres each. The average farm unit in these projects embraces 40 acres, and it will be necessary for the entrymen who hold larger tracts to dispose of their holdings in excess of one farm unit, which will have the effect of doubling or even trebling the number of settlers in these projects.

Farm-unit plats have also been approved and filed, and public notices issued opening to entry large tracts within the Grand Valley project, Colorado; Boise project, Idaho; and the Klamath and Umatilla projects, Oregon. Large areas, which it has been found were not needed in connection with the various projects, have been released from the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and restored to entry under the general provisions of the public-land laws. Withdrawals have also been made of tracts which it is considered will be irrigable from existing or contemplated projects.

The importance of this irrigation work, and the desirability of homesteads within Government projects, is evidenced by the volume of inquiries which are received from prospective applicants relative to the terms and conditions under which they can make entries upon irrigated lands. The value of these lands is further shown by the consideration stated in deeds of assignments, which in some cases,

notably in the Yuma project, Arizona, have been as high as $6,500 for a 40-acre farm unit once considered worthless, barren desert land.

During the fiscal year ending June 30, 1917, there were examined and accepted 351 assignments of homestead entries in reclamation projects and 19 such assignments were rejected. The decisions of registers and receivers were reversed in 42 cases on appeal, and affirmed in 121 cases; 1,291 original homestead entries were examined and accepted; 26 original entries were canceled by this office, and 119 were canceled by relinquishment; 812 final homestead entries were approved for patenting and 16 were canceled; 41 original homestead entries were amended; 16 assignments of desert-land entries, within irrigation projects, were accepted, and 3 applications for extensions of time within which to submit final proof on desert-land entries, within irrigation projects, were allowed; 8 original desert-land entries, subject to the reclamation act of June 17, 1902, were examined and accepted, and 1 was canceled; 12 final desert-land entries were approved for patenting.

LIEU SELECTION FOR LANDS IN NATIONAL FORESTS AND INDIAN RESERVATIONS.

In the matter of selections in lieu of lands in national forests under the act of June 4, 1897 (30 Stat., 36), which act, with certain exceptions, was repealed in the year 1905 because of attempts at fraud, there are now pending only about 500 selections, involving between 80,000 and 130,000 acres. Some of these selections are awaiting survey of the lands selected, some are suspended for investigation as to the character of the selected land as mineral or otherwise, and some are suspended on account of alleged fraud in acquisition of title to the base land from the States of California and Oregon; of these last, some are pending action on field investigations made, and some are under contest charges by the Government. It is believed that selections have been made for all of the base lands for which selection is permissible except about 20,000 acres.

In the year 1913 the State of Oregon instituted suits in the State courts to annul a large number of patents issued by the State for approximately 25,000 acres of lands which were thereafter offered to the United States in exchange for lands selected under the act of June 4, 1897, alleging that the lands had been acquired from the State by fraud, and under directions from the department, action on all pending selections involving Oregon base lands embraced in such suits has been suspended. These lands are included in the 500 pending selections above mentioned.

During the past year 145 of these selections have been approved for patenting and 37 have been canceled. Adverse proceedings were

directed against 13 of these selections, and hearings were had in 40 cases. This office has rendered decisions in 40 of these Government contest cases, 11 of which were in favor of the selector and 29 adverse. The latter were all appealed to the department. Approximately 170 cases were suspended by reason of proceedings pending in the courts or for administrative reasons. On July 1, 1917, there were pending in the department, transmitted by this office, approximately 150 contest cases of the so-called Hyde-Benson selections, involving approximately 25,000 acres of land. Some of these are covered by a suspension order, based upon the pendency of proceedings in the courts.

Under authority of the act of April 21, 1904 (33 Stat., 211), selections have been made of public lands in New Mexico and Arizona of approximately 1,400,000 acres in lieu of lands in Indian reservations, and patents have issued for these lands. On June 6, 1916, the department decided not to allow any further exchanges under this act, except possibly in some unusual cases which would be found to the benefit of the Government to permit, or where the selector may have acquired some equities. Under these exceptions, there are still outstanding approximately 50,000 acres of base land in Arizona and approximately 10,000 acres of base land in New Mexico, or a total of 60,000 acres, subject to exchange under the act of April 21, 1904.

CHIPPEWA LOGGING IN MINNESOTA.

Chippewa logging operations in Minnesota are drawing to a close. In this case the Government sells the timber, supervises the cutting, scales the timber, and collects the money, which it deposits to the credit of the Chippewa Indians. The results have been most satisfactory. The cutting has exceeded the estimates by over 350,000,000 feet, or nearly 50 per cent.

A sale of this timber under sealed bids was held the past year under the Morris Act of June 27, 1902 (32 Stat., 400). This was the ninth and probably the last public sale of timber under this law. The timber offered was mostly left unsold from previous sales. The amount of timber sold, according to the estimates, was 2,230,000 feet. It brought $13,030.19, an average of $5.82 per thousand feet.

The logging operations the past year consisted in the cutting of 12,935,820 feet of timber, valued at $111,964.32. This is the smallest amount cut any year since the logging operations started, 13 years ago. Last year's cutting was 28,470,380 feet of timber, valued at $193,426.42. The loggers are allowed a limited time in which to cut the timber included in their contracts, and where they apply for extension of time interest on the deferred payments is charged. During the past year the loggers paid $13,883.06 for such privilege.

The total amount cut during 13 years of logging operations is 1,268,956,646 feet, for which $8,983,657.22 were paid, and in addition thereto charges for interest amounting to $25,191.54 have been collected. The average stumpage price of the timber scaled has been $7.07½ per thousand feet. The total expense of the logging operations for 13 years has been $383,760.76, which is 4.27 per cent of the receipts from the timber.

During the past year the death occurred of Mr. William O'Neill, who had been superintendent of logging since the beginning of these logging operations, and who had proved a most faithful, honest, and capable officer. He has been succeeded by Mr. John D. Caldwell, formerly assistant superintendent.

MINNESOTA DRAINAGE CASH ENTRIES.

This is another class of cases where residence on and improvement of the land are not required, and consequently the lands are in active demand. The public lands in Minnesota are subject to the State drainage laws, under authority of the act of May 20, 1908 (35 Stat., 169), known as the Volstead Act, and are sold by the State authorities for nonpayment of the drainage charges. The purchaser at the sale assumes payment of such charges, and, where the lands are unentered, upon payment at the district land office of $1.25 per acre, or such other price as may be fixed by law for the land, secures title. In case of entered but unpatented lands, the tax purchaser may exercise his right to obtain title only upon relinquishment of the existing entry or after the expiration of the period of redemption, none having been made.

A sale of land under this act was held in May, 1917, but as purchasers are allowed 90 days in which to make entry, the number of entries resulting from such sale can not be stated at the present time.

There have been approved for patenting during the fiscal year 1,142 entries made under the Volstead Act, which were mostly for an area of 160 acres each, the limit allowed any one purchaser, and the area thus patented was in the neighborhood of 182,500 acres. There are still pending 125 of these entries.

One of the questions which was discussed for two or three years was the disposition of the excess over and above the drainage charges bid in by purchasers at the sale. Under the law as originally enacted the excess in the case of entered lands went to the entryman, but in the case of unentered lands the excess or bonus, in accordance with the construction placed upon the law by the department, went into the Treasury to the credit of the United States or the Chippewa Indians, as the case may be.

On September 5, 1916 (39 Stat., 722), Congress passed a law under which the excess in the case of unentered lands is to be used by the

county in which the land is located for the purpose of maintenance, improving and extending the drainage works within the area benefited by the drainage project in which such lands shall have been assessed for such drainage charge.

During the past year the department upheld the rulings of this office, rejecting applications to purchase under the Volstead Act, wherein the applicant, who had a previous homestead entry for the same land he desired to purchase, failed to pay the drainage taxes as they became due, allowed the land to be sold for nonpayment of the taxes, and subsequently attempted to qualify as a purchaser by the voluntary relinquishment of his homestead entry and the payment to the State of said taxes.

No special consideration has been given to the matter of the community value, commercial or agricultural, in the disposition of vacant public lands by public sale with a view to facilitating a common or joint improvement, as provided in the Volstead Act, but judging by the number of assessment lists received showing the construction of new drainage ditches and the number of entries for such lands, the drainage of the land by projects constructed under the authority of the county boards of the several counties and the judges of the district courts in accordance with the State law must be beneficial to the State and the community at large. Furthermore, it has provided a method by which large areas, open to entry years ago and not taken because of their swamp condition, have been disposed of, the lands placed on the tax lists, and where ceded Indian lands the amount of $1.25 per acre, the price at which these lands were opened to homesteaders, placed to the credit of the Chippewa Indians.

PUBLIC SALE OF INDIAN LANDS.

There is a great demand on the part of the public, especially from cattlemen and stockmen, to secure title to Government land by a method which does not require residence on and cultivation of the land, and the office is continually flooded with letters relative to lands to be sold. All tracts which are offered at public sale without such requirements find ready purchasers, usually at good prices.

Two sales of undisposed of lands in the Uintah Reservation, Utah, have been held in previous years, and a third sale, embracing lands which had been offered at previous sales and not sold was held at Provo, Utah, commencing on June 18, 1917. The sale was for cash, as provided in the act of March 3, 1905 (33 Stat., 1069). The minimum price was fixed at 50 cents per acre, and no more than 640 acres were sold to any one person. The offering consisted of 386,218.07 acres, listed for sale in 1,632 tracts, each tract embracing the undisposed of contiguous land in the north and south halves of

sections. There were sold at said sale 931 tracts, embracing 200,684.74 acres, for the total sum of $151,644.56, or an average of 75½ cents per acre; this was 51 per cent higher than the minimum price fixed for the sale. The unsold lands are to be disposed of at a future public sale.

On November 22, 1916, the property known as the Ojo Caliente Reservation, consisting of five sections of land, or 3,200 acres, situated in Socorro County, N. Mex., on which were the buildings, now ruins and worthless, of the agency of the former Hot Spring Indian Reservation, was sold at public auction. The land was principally grazing lands, and the waters from the springs on this reserve had been appropriated by the town of Monticello, situated about 18 miles distant, so that it looked as if the purchaser were buying a lawsuit. The property sold in one body for $13,000, or $4.06 per acre. All things considered, this was a good price.

Public offerings of Indian lands, to take place during the coming fall, include five sections of timber lands in the former Siletz Indian Reservation, Oreg., under authority of the act of May 13, 1910 (36 Stat., 367). These lands had been set apart as a timber reserve by treaty with the Indians. The lands were examined by a timber cruiser, who found 170,620,000 feet of timber on the 3,259.54 acres examined. The minimum value of the timber offered is $146,540, and the minimum price of the land is $4,074.44, making the total minimum valuation of the timber and land $150,614.44 The sale was advertised to take place at Portland, Oreg., on September 25, 1917.

The undisposed-of lands in the Crow Indian Reservation, Mont., not including lands opened under the reclamation act, will be sold at Billings, Mont., on September 4, 1917, at not less than $2 per acre, coal lands to be sold with a reservation of the coal deposits, as provided in the act of February 27, 1917 (39 Stat., 944). The lands were listed for sale in tracts embracing the north and south half of sections or contiguous lands subject to disposition in such half sections. Payment of one-fifth of the purchase price was required at the time of sale, the balance in four equal annual installments.

The public offering of 18,524.14 acres, scattered in 15 townships, of undisposed-of lands in the former Coeur d'Alene Reservation, Idaho, was advertised for August 16, 1917, at Coeur d'Alene, Idaho. These lands had been opened to homestead entry on May 2, 1910, and under the law under which they were opened, viz, the act of June 21, 1906 (34 Stat., 335), they are to be sold at not less than $1 per acre.

Another sale of Flathead lands was also advertised to take place in August. These lands had been opened on May 2, 1910, under the act of April 23, 1904 (33 Stat., 302), and the sale is authorized by said act, the lands to be sold at not less than their appraised price.

The schedule embraces 14,060.31 acres, scattered in 36 townships in both the Kalispell and Missoula districts. The date for the sale of land in the Kalispell district was fixed for August 20, 1917, at Kalispell, and for the Missoula land district, August 30, 1917, at Missoula.

An offering of unsold lands in the former Rosebud Indian Reservation in Gregory County, S. Dak., embracing five tracts of approximately 200 acres, was held on August 6, 1917, under authority of section 2, act of April 23, 1904 (33 Stat., 254).

OPENING OF PUBLIC AND INDIAN LANDS.

During the past year there has been keen interest on the part of the public in the opening to entry of Government lands. This is not confined to any one section of country, but is general throughout the United States.

One of the largest reservations opened during the past year was the Fort Assinniboine abandoned military reservation, Montana. This reservation was opened to homestead entry in November, 1916, under a special act of Congress, the entryman being required to pay $2.50 per acre for land entered during the first six months after the opening. The regulations provided for the filing of applications for these lands during a period of 20 days, and, in case of conflict, for a drawing to determine the right of priority. This was the first time this method of opening lands had been tried on so large a scale, and the method was severely tested. The schedules described 93,605.63 acres of agricultural lands and 2,180.86 acres of coal lands. These lands were divided into 623 tracts or units, and each applicant was required to file for a unit or part of a unit. There were 1,125 applications filed for 264 of these units; no application was submitted for 359 units. No conflicts were found as to 96 of these applications, but the remaining 1,029 involved only 168 tracts. As many as 72 applications were filed for the same tract. After the nonconflicting applicants and applicants successful at the drawing had made their entries the remaining lands were thrown open to entry in the usual manner. Within five days thereafter about 100 applications were filed for the undisposed-of lands.

The demand for lands in the former Flathead Indian Reservation, Mont., continues and there is very little land subject to entry which has not been filed upon. Applicants are endeavoring to secure a prior right to enter lands classified as timber lands, as well as other lands not yet opened to entry, by filing their applications, and appealing where their applications are rejected. All such applications have, however, been rejected by this office. These timber lands are being reexamined with a view to determining their value for agriculture or horticulture, and in case it is determined to open the lands,

the homesteader will be required to pay the full value of the timber at the time of making entry, and to pay the appraised price of the land in installments. The first reclassification and reappraisement under the act of May 18, 1916 (39 Stat., 139) has recently been approved, and regulations have been adopted for the opening of the lands. The schedules include 2,693.46 acres of nontimbered lands and 4,983.58 acres of timbered lands. The nontimbered area was appraised at $7,150.72, an average of $2.65 per acre, and the timbered area at $24,706, an average of $4.95 per acre. The estimates show that there are 19,743 M feet of timber on the timber area which have been appraised at $38,697 additional, or an average of $1.96 per M feet. The average price of the timber per acre opened is $7.76. Combining the appraised price of the land and the timber, the average price per acre of the timber land opened is $12.71; surely a high price for a homestead proposition. The regulations provided for the reception of homestead applications for these lands from September 1 to 15, 1917, and in case of conflicting applications, for a drawing on September 17, 1917, for lands in the Missoula district, and on September 20, 1917, for lands in the Kalispell district.

In my annual report for the year 1915 (pp. 38 and 39) I referred to the fact that settlers on the Flathead Reservation, who went upon unappraised lands in 1910 and 1911, were objecting to paying the prices fixed by an appraisement made in the year 1913, and insisting that the values fixed by the original appraisement commission should govern. They had gone on the lands expecting to pay the same values as other settlers who took up appraised lands in 1910 and 1911, but the 1913 appraisement was made to agree with existing values. Remedial legislation was attempted, but failed of enactment into law. On August 3, 1917, under authority of the act of June 6, 1912 (37 Stat., 125), the lands covered by all subsisting entries filed between August 26, 1910, and June 14, 1911, were reappraised, pursuant to instructions from this office to the local land officers, and values fixed similar to those fixed by the original Flathead appraisement commission in 1907–8, viz: Seven dollars per acre for first-class agricultural land; $3.50 per acre for second-class agricultural land, and $1.50 per acre for grazing land, lying east of the Flathead River, and $5 per acre for first-class agricultural land; $2.50 for second-class agricultural land and $1.25 per acre for grazing land, lying west of the Flathead River.

The records of this office show that there are 52 subsisting applications and entries for these lands, filed between the dates mentioned, involving an area of 5,046.15 acres, the price per acre ranging from $3 to $30. The new prices will effect a saving to the settlers of about $22,000.

The lands in the diminished Colville Indian Reservation, Wash., to the extent of 422,144.01 acres, were opened to homestead entry in July, 1916, and 90,410 persons registered for these lands. Of 5,500 names first drawn and designated to make entry, however, only 489 persons responded to their names and made selections, and of this number 340 made entries and 149 failed to make entry. The lands undisposed of are subject to homestead entry at the appraised prices.

Lands in the Colville Reservation which are classified as timberland are not subject to homestead entry, but are under existing law to be sold under sealed bids to the highest bidder for cash or at public auction, as may be determined. Nevertheless, applications are being filed for the reclassification of these lands, with a view to make homestead entry of the lands if reclassified as agricultural land.

TOWN-SITE AND TOWN-LOT ENTRIES.

During the past fiscal year a great demand has existed for town lots, indicating thereby a prosperous condition of the country. Such demand for town lots for business purposes measures the growth and prosperity of the country, and from present appearances there will be no decrease in the demand for the coming season. There were 161 of these town-lot entries pending at the beginning of the year, and during the year 882 entries were received; 989 were approved for patenting, and there were pending at the close of the year 54 town-lot entries. In addition, six regular town-site entries were received and approved for patenting. There were pending at the beginning of the year 21 entries, involving Alaska missions. Alaska sites for trade and manufacture, park and cemetery sites, and 11 additional were received during the year. Of these, 19 were approved and there are still pending 13 entries.

Numerous lots and town-sites have been sold on the installment plan, part of the purchase price being paid at time of sale and the remainder in one or more installments, not exceeding four. In such cases no final entry issues until full payment has been made.

Sales of lots in 5 town sites in the former Fort Peck Indian Reservation took place June 7 to June 9, 1916, but no information having been received of the result no mention was made of the sales in my last report. These lots, aggregating 1,264, were sold on the installment plan for $8,024.

Public sales were held in former Indian reservations on the installment plan as follows:

In Colville Reservation, Wash., 171 lots were sold in Nespelem on July 14, and 29 lots in Astor on August 17, 1916, for $10,564; in Spokane Reservation, Wash., 73 lots in Klaxta were sold on Septem-

ber 25, 1916, for $1,587; in Coeur d'Alene Reservation, Idaho, 1 block and 54 lots in the town of Desmet were sold on August 21, 1916, for $1,510; and in Fort Berthold Reservation, N. Dak., 257 lots in Sanish, 60 in Parshall, and 23 in Van Hook were sold on November 11, 1916, for $57,336. The total sales in these reservation town sites aggregate $70,997.

Town lots in reclamation projects in Montana have been sold at public sale on the installment plan as follows:

At Pompeys Pillar on November 28, 1916, 27 lots were sold for $2,550; at Huntley on December 8, 1916, 8 lots were sold for $1,329; at Ballantine on December 28, 1916, 10 lots were sold for $1,425; and at Zurich on June 23, 1917, 42 lots were sold for $746.75. The sales of the lots in these reclamation town sites aggregated $6,050.75.

Public sales of other town lots have been ordered during the fiscal year, but to take place after its close, as follows:

In Timber Lake, in Cheyenne River Indian Reservation, S. Dak., on July 10, 1917, 198 lots were sold for $10,219; in Dupree, in the same reservation and on the same date, 25 lots were sold for $2,432; in Duchesne, in Uintah Indian Reservation, Utah, on July 2, 1917, 219 lots were sold for $5,095; and in Powell, in Shoshone reclamation project, 57 lots were sold for $11,082.50. The above sales were on the installment plan.

Public sales of lots, some of which have taken place but no report has been received of the result, have been ordered in the following town sites.

Cedarvale, N. Mex., on July 30; Inchelium, Wash., on August 10; and in Montana at Yellow Bay, August 23; Big Arm, August 25; Camas, August 27; Deaver, August 29; Tabor, September 10; Pablo, September 13; and Belltower on September 29, 1917.

The order setting aside land for town site of Chelsea, Mont., was revoked January 26, 1917, and the order withdrawing land for Wamblee town site, South Dakota, was revoked in part on March 31, 1917. Applications for the revocation of the order reserving Minneota town site, South Dakota, are pending. A survey of an addition to Myton town site, Utah, into lots and blocks has been ordered.

TOWN SITES IN ALASKA.

The town site of Anchorage, on the line of the Government railroad in Alaska, was surveyed into lots in June, 1915. A sale of the lots was held in July and another in August of that year, at which 1,887 lots were sold for $177,105. The lots were sold for one-third cash, the balance to be paid in four equal annual installments. The initial payment derived from the sales amounted to $60,773.55. Since the original survey an amended survey has been made creating two additions to said town site, designated Anchorage, East and

South additions, respectively. In July, 1916, 1,059 lots were sold in the town site and its additions for $212,020, on the same terms as in the former sales, the annual payments amounting to $82,445.55. A third addition has been subdivided into lots and will probably be offered for sale this season, together with unsold lots in the town site. The value of the lots and the demand for them appear to be on the increase.

This town is situated on Knik Arm, an arm of the Cook Inlet. It has a good harbor, and is the headquarters of the Alaskan Engineering Commission, employed in the construction of the Government railroad. It will be connected by said railroad with Seward, on Resurrection Bay. It will undoubtedly be a good shipping point for the products of the coal and copper mines of that region. The regulations under which the lots have been sold prohibit the issuance of patent for five years from date of sale, during which time the use of lots for the sale or manufacture of intoxicating drinks, gambling, and other unlawful purposes works a forfeiture of all rights to such lots and the money theretofore paid thereon; also a failure to comply with any regulations or requirements which may be prescribed by the Secretary of the Interior for the improvement of streets, sidewalks, and alleys, promotion of sanitation and fire protection in the town site, or make lot payments when due, works a similar forfeiture.

The regulations have recently been amended so as to eliminate the forfeiture clause regarding the manufacturing, selling, or otherwise disposing of intoxicating liquors as a beverage or for gambling and other unlawful purposes. The reason for such elimination is the fact that the laws of the Territory appear now to be sufficient to cover all cases above mentioned, and the clause operated to impair titles and retard improvements.

The town-site improvements above mentioned were to be at the lot purchaser's expense. Yet, notwithstanding all these restrictions and regulations, lots 50 by 140 feet in size were sold for from $25 to $1,155 each.

By act of April 17, 1917 (Public No. 2), not to exceed 50 per cent of the moneys received from the sale of lots within any town site or town sites heretofore or hereafter sold, under the act of March 12, 1914 (38 Stat., 305), the act providing for said Government railroad, may be set aside in the discretion of the Secretary of the Interior and expended within the respective town sites in which such lots or tracts are sold for the purpose—

of preparing the land for occupancy, the construction, installation, and maintenance of public utilities and improvements, and the construction of public-school buildings, under such terms and conditions as the Secretary of the Interior may prescribe.

Under the provisions of said act the purchasers of lots will reap the benefit of 50 per cent of the proceeds of sales in public improvements in their respective towns. The town has a population of about 5,000, and there is no reason why under the present regulations for the disposal of lots therein the town should not rapidly increase. In fact, it would appear to be in its embryo state, inasmuch as it has not begun to receive the products of all the copper and coal mines tributary to it.

Two Government additions to the town site of Seward, Alaska, designated Federal and Cliff additions, respectively, have been subdivided into lots and blocks. One hundred and fifteen lots were sold on September 11, 1916, in said additions for $26,630. The lots in said additions were sold for one half cash and the other half to be paid in one year from date of sale and without restrictions as to the manufacture and sale of liquors on the premises and use of the land for gambling or other unlawful purposes.

In July, 1916, 56 lots were sold in the town site of Matanuska for $8,930. This town is adjacent to the Matanuska coal fields.

In August, 1916, 354 lots in Nenana town site, Alaska, at the junction of the Nenana and Tanana Rivers, were sold for $132,525. This place also gives promise of becoming an important town.

June 20, 1917, 47 lots were sold in the town site of Wasilla for $5,540, under the same regulations as were provided for the disposition of the lots in the additions to Seward. The initial payment for said lots amounted to $3,027.50. The town site of Moose, on the line of said railroad, has also been surveyed, and a sale has been authorized, but no report has been received relative thereto.

Under the provisions of section 11 of the act of March 3, 1891 (26 Stat., 1095), C. R. Arundell, Chief of Alaskan Field Division, has been appointed trustee for the disposition of the lots in the town sites of Wrangell, Douglas, and Haines. An addition to the town site of Juneau has also been surveyed, and protests have been filed against any disposition of the same under said town-site law, and a hearing thereon has been ordered. The survey of the town site of Petersburg has been ordered. The town site of Ketchikan has been disposed of and the trust closed.

Southern and central Alaska is rich in coal and copper and the precious metals. The valleys are fertile and well adapted to the raising of grains and other agricultural products. The town sites, especially along the Government railroad, have all the conveniences of civilized life, and there appears to be a bright and brilliant future for this portion of Alaska.

ABANDONED MILITARY RESERVATIONS.

There are a number of abandoned military reservations which are to be disposed of in the near future, or as soon as the preliminary work of surveying, preparing the plats, and appraising the lands is

completed. Most of these reservations are to be disposed of under the act of July 5, 1884 (23 Stat., 103), under which the lands are to be offered at public sale for cash at not less than the appraised price. Among the abandoned military reservations thus to be disposed of are the following:

Bayside (Point Comfort), located in Monmouth County, N. J., and containing 25.734 acres. An informal offer of $7,000 has been made for the property, but under the law mentioned the land is to be surveyed and appraised and sold at public auction to the highest bidder for cash.

Batton Island, Fla., situated at the mouth of St. Johns River, south of St. George Island. The lands have been surveyed and appraised, but the work has not yet been accepted.

Virginia Key and Key Biscayne, Fla., except lands reserved for lighthouse purposes or passed to the State under the swamp-land act. The work of surveying these lands is in progress. The lands are near Miami, Fla., and are therefore very desirable.

Reservations Nos. 23 and 24, comprising 1,239.20 acres, situated on the Narrows not far from Tacoma, Wash., are to be disposed of under the act of July 3, 1916 (39 Stat., 342). The lands have been subdivided into 20-acre tracts, but the survey has not been accepted. The act in question gives settlers on the lands on January 1, 1910, a preference right to enter not exceeding 20 acres at the appraised price, and the remaining lands are to be sold at public auction.

Fort Sabine, comprising land in Cameron Parish, La., is perhaps the largest reservation to be disposed of in the near future. The lands have been surveyed but the plats have not yet been filed. These lands have been in dispute for about 40 years, on account of State swamp selections. The lands are near the Beaumont oil fields, and hence a great deal of interest is attached to them.

The act of September 7, 1916 (39 Stat., 739) set aside 8,880 acres situated along Beaver Creek in the former Fort Assinniboine abandoned military reservation as a picnic place or camping ground for the public. The sheepmen were threatening to pollute the waters of said stream and to destroy the fish therein, as well as defeat the desirability of the place for camping purposes by driving their sheep on the reservation. To meet this situation the city of Havre, Mont., has been appointed caretaker of this reserve.

During the past year the former military reservation of Fort Ringgold, Tex., which has been surveyed and appraised for disposal in accordance with the provisions of the act of July 5, 1884 (23 Stat., 103), was again turned over to the War Department by Executive order for military purposes.

RAILROAD GRANTS.

Railroad and wagon road selections were received during the year to the amount of 986,596.05 acres, as against 1,958,444.32 acres in 1916. There were patented 1,586,807.98 acres as against 2,208,178.82 acres

patented in 1916, the decrease being due largely to press of other work, particularly on the Oregon and California grant lands.

A fifth grant has been added to the four mentioned in my report of 1916 that are only awaiting opportunity to take some minor action to close out.

The suit mentioned in the report of 1916 of the Southern Pacific Railroad Co. to test the right of the Government to incorporate in its patents for indemnity lands a reservation under the act of August 30, 1890 (26 Stat., 391), for canal, ditches, etc., was determined by the courts in favor of the Government, and the company filed a statement setting forth that while it would accept such patents it did so under protest. The other suits mentioned, being those of the Central Pacific and Northern Pacific Railway Cos. to test the right of the Government to withdraw from disposition lands within the railway indemnity limits included in pending unapproved indemnity selections, and that of the Northern Pacific Railway Co. to determine what constitutes a mineral classification under the act of March 2, 1899 (30 Stat., 993), are still pending before the courts.

OREGON AND CALIFORNIA RAILROAD LANDS.

In my last annual report I made a statement, somewhat at length, covering the history of the grant made in aid of the construction of the Oregon & California Railroad, the failure of the company to abide by and carry into execution the terms of the grant, and the consequent legal proceedings instituted by the United States for the forfeiture of the grant, or the enforcement of its terms, with the resulting decision of the United States Supreme Court, June 9, 1915 (35 Supreme Court Reporter, 908–238 U. S., 393), followed by the act of Congress, June 9, 1916 (39 Stat., 218), revesting in the United States all the lands patented to the Oregon & California Railroad Co. under its grant, and the lands to which it was entitled to receive a patent under said grant, remaining unsold July 1, 1913. By this act the lands thus revested in the United States are to be examined in the field and classified in accordance with their chief value, as power-site lands, timber lands, or agricultural lands, and be disposed of in accordance with such classification, though in the case of lands classified as "timber lands" the timber is to be sold separate and apart from the land, which, after the removal of the timber, will become subject to homestead entry. Provision is also made in said act for the payment to the several counties in the State of the unpaid and accrued taxes due on the lands title to which has been revested in the United States.

The proceeds of these lands thus returned to the public domain, after reimbursement to the United States of all proper charges,

will be divided between the State and the United States in such a manner that the State will receive 50 per cent; of the remainder 40 per cent will be paid into the general reclamation fund of the United States and 10 per cent into the general funds of the Treasury.

Promptly after the passage of the act of revestment the classification of the lands in the field was undertaken, and the office was fortunate in finding available a large number of first-class experienced cruisers familiar with the conditions in this field. The work of classification commenced in the southern portion of the revested lands at the California boundary line, and during the season that followed over 900,000 acres were covered, the work progressing northward to the southern boundary of Lane County, the cost of classification averaging about 7 cents per acre.

Reports have been received from the field work of that season, and have been made the subject of study and tabulation in this office, to the end that we may be enabled at the very earliest date possible to provide for the restoration to agricultural entry of all lands thus classified and at the same time furnish to all intending settlers or applicants such a tabulated statement, derived from the classification, as will enable them to secure a general knowledge of the character of the lands with respect to soil, topography, rivers, streams, locations of roads, towns, and cities; in short, give them the full benefit of all information derived by the classification.

In the matter of the payment of taxes no time was lost in carrying into execution the terms of the act, which provided in section 9 for their payment as "soon as may be after the approval of this act." A special officer was designated by the department to act in conjunction with the field division at Portland, in the ascertainment of the taxes due the several counties traversed by the grant. A full schedule of the taxes claimed by the several counties has been secured and is on file in this office. Due to the cooperative relations existing between the Department of Justice and the Department of the Interior in the administration of the act of revestment the payment of taxes has been the subject of consideration between the two departments. All action, however, was necessarily suspended during the pendency of the appeal by the railroad company from the decree entered in the United States district court, under the decision of the Supreme Court, including therewith the constitutionality of the act of revestment. The court, however, April 23, 1917 (37 Supreme Court Reporter, 443) fully upheld the validity of the act, so that we are now relieved from any further possibility of litigation on that subject. The payment of the greater part of the taxes will, therefore, probably be an accomplished fact by the time this report has gone to press.

Section 4 of the act of revestment provides for the sale of the timber on lands classified as timberlands—

at such times, in such quantities, and under such plan of public competitive bidding as in the judgment of the Secretary of the Interior may produce the best results.

In several instances it is known that small bodies of land so classified are practically isolated from lands of a similar character revested in the United States by said act, but are in the immediate vicinity of timberlands in private ownership where logging operations are in progress. The Oregon and California timberlands for the most part are rough and rugged, if not actually mountainous in character, requiring large expenditures in the way of logging railroads and similar equipment to successfully cut and remove the timber, all of which involves a heavy expenditure; so that a sale of timber thus situated can not be advantageously made except to operators in the immediate vicinity, who are already provided with the proper equipment for handling the timber. If opportunities for such sales are allowed to pass it might be many years before the Government would be enabled to sell the timber at a fair estimate of its value; so the proper policy on our part in such cases suggests that such a market for isolated tracts should be taken advantage of whenever it occurs, and to this end I have submitted regulations providing for the sale of small bodies of Oregon and California timberlands that are thus isolated, not intending, however, to recommend any sales of considerable bodies of timberlands.

The lands returned to Federal ownership amount approximately to 2,300,000 acres, of which a large proportion are heavily timbered. The act of revestment, as heretofore noted, provided for the sale of the timber apart from the land under certain conditions and limitations specified therein. Inasmuch as the grant to the company was of odd-numbered sections, and it had prior to the act of revestment sold some of the granted lands to lumber companies and others, who also held the title to the even-numbered sections, it follows that the United States now has title to the revested odd-numbered sections, while the title to the even-numbered sections within the grant limits, as well as the odd-numbered sections sold prior to July 1, 1913, is now in private ownership.

The scattered holdings thus resulting of timberlands by the United States will seriously interfere with the advantageous disposition of the timber, for the reason that the lands are for the greater part exceedingly rough and mountainous, involving a heavy initial outlay before successful logging operations can be set on foot, as well as a corresponding expenditure to maintain such operations. Successful logging operations then in this region call for the ownership of timberlands in large bodies, and prices paid for timberlands will

be to a large degree affected by the possibilities of thus blocking them up for future operations. It is apparent, however, that when these lands are offered for public sale that the competitors at said sale will be few in number, due to the fact that only the holders of adjacent lands in private ownership will be in a position to take advantage of the subsequent ownership of these lands, so far as the successful prosecution of future logging operations is concerned. What has been said with respect to the decreased value of the lands thus held in public ownership is equally true as to the lessened value of those held in private ownership, due to the same conditions.

For these reasons, the department has recommended legislation authorizing the Secretary of the Interior to consolidate the present holdings, under the act of revestment, with lands adjacent thereto now held in private ownership and thus be enabled to offer for sale, in single blocks, large bodies of timberlands, eliminating thereby the advantage at public sale now held by the owners of adjacent lands. Legislative action as thus recommended is now pending before Congress in H. R. 5489 and S. 2759, identical in character.

The duties imposed upon the Land Department in the proper administration of the act revesting the Oregon and California lands in the United States, as may be readily seen from the foregoing, call for the most careful and painstaking attention to many details, one of which has been the importance of preventing the exploitation of these lands by unscrupulous and fraudulent land locators at the expense of intending settlers and applicants, who may be thereby induced to expend money, time, and labor all to no purpose.

Repeated announcements to prevent such a condition, so far as possible, have been made by circular information sent through the local officers, the field division, to the public press, and otherwise, advising the public generally that these lands are not yet open to entry and settlement; that in the meantime it is utterly useless for any person to attempt to acquire any preference right upon any of these lands, inasmuch as there is no method or manner by which any settlement or filing can be made that would give such right for the purchase or acquisition of any of these lands.

It will be remembered that the title revested in the United States was not only of the unsold patented lands but also those " for which the grantee is entitled to receive patents," for all of which the company, under said act, is to receive $2.50 per acre; a provision which necessarily entails a complete adjustment of the grant in order that the lands to which the company is entitled to receive patent may be determined and the liability of the United States to the company therefor thus ascertained. During the year that is past this work of final adjustment of the grant has been prosecuted with all diligence,

so that at the present time it is in a satisfactory condition, both as to work in the office and the field.

At the opening of the present season the classification of the grant lands was resumed and is now proceeding with all expedition consistent with accurate results.

RIGHTS OF WAY.

Owing largely to the scarcity of labor and the uncertainty as to when these conditions will be bettered, together with the practical impossibility of financing even first-class projects because of the needs of the Government, right-of-way applications received have been somewhat below the average during the past year. Railroad construction and projection has been especially affected by these conditions, and for the additional reason that rails and other ironwork have been difficult to obtain for delivery in the immediate future. This state of affairs is accounted for by the great demand for iron and iron products for war purposes.

However, 96 railroad applications have been received during the past year.

Forty-four applications were approved, 37 accepted, and 24 rejected, a total of 105 disposed of, as against 96 received, cutting down the pending by 9, and leaving but 30 pending office action and 270 awaiting action elsewhere at the end of the year.

"All other rights of way" (not including power permits and stock-watering reservoirs) did not run quite so heavy as in the preceding year, for the same causes which made the railroad rights of way lighter. Five hundred and twenty-eight applications were received, as against 672 the previous year, making 1,027 actually pending.

Of these, 29 were referred to other divisions, 118 approved, 249 accepted for filing, 146 rejected, 1 relinquished, 5 otherwise disposed of, and 462 held for action elsewhere, leaving but 17 pending office action immediately.

Stock-watering reservoirs are still actively applied for. At the beginning of the past fiscal year 7 applications were pending office action. During the year 315 applications were received for action. Of these, 5 were approved, 139 examined and accepted, 70 canceled, and 100 held for action elsewhere, leaving but 8 pending office action and 169 pending action elsewhere.

FORFEITED RIGHTS OF WAY.

The work of clearing the records of outstanding rights of way which have either been forfeited under the several forfeiture acts or are subject to forfeiture by judicial decree has been actively prosecuted.

During the past year 151 new cases have been drawn from the files, with the view of finally disposing of the same. Of this number 1 has been declared forfeited by judicial decree, 22 under the forfeiture acts, 26 canceled on relinquishment, 71 disposed of upon the filing of acceptable proof of construction, and 8 canceled for other reasons. Suits have been recommended in only two cases.

However, 376 of these cases have been considered and acted upon during the year, of which 248 are awaiting some action by the grantees of the easement or by some other bureau of the Government before final action can be taken by this office.

This leaves the office current and up to date on this class of work.

POWER PERMITS.

The policy of the department relative to the power situation is being justified in a marked degree by the result of last year's showing in comparison with the previous year. During the year 1916, ending June 30, 5 preliminary and 10 final permits were issued, for which the various permittees paid into the Treasury of the United States a total of $2,918.30. During the past year permits under the act of 1901 (31 Stat., 790) and so-called easements under the act of March 4, 1911 (36 Stat., 1253), have been issued, which, together with second payments on permits theretofore issued, has netted the Government $8,407.33, over three times the amount collected during the previous year. Several of the permits issued last year and theretofore have been canceled, either because of abandonment or because the small amounts required to keep them alive have not been paid.

During the past fiscal year preliminary power permits were granted to the parties named, under the provisions of the act of February 15, 1901 (31 Stat., 790):

F. G. Baum, power project in Arizona.
Montana Power Co., power project in Montana.

The following final permits were granted during the fiscal year under the provisions of the act of February 15, 1901:

Mountain King Mining Co., power project in California.
Pacific Power Corporation, power project in California and Nevada.
Gem Irrigation District, power project in Idaho.
Coachella Valley Ice & Electric Co., power project in California.
United Verde Copper Co., power project in Arizona.
Glenwood Light & Water Co., power project in Colorado.
Colorado Power Co., power project in Colorado.

Easements for power transmission lines were granted during the fiscal year to the following-named parties under the provisions of the act of March 4, 1911 (36 Stat., 1253):

Southern Sierras Power Co.
Keating Gold Mining Co.
Utah Power & Light Co.
Pacific Power & Light Co.

During the fiscal year ending June 30, 1916, $2,918.30 was collected and deposited in the United States Treasury in connection with power permits, while during the fiscal year just closed the following amounts were collected and deposited:

	Amount.
Great Falls Power Co	$455.05
Truckee River General Electric Co	41.35
Mountain King Mining Co	63.00
Pacific Power Corporation	2,830.56
Buckhorn Mines Co	13.25
Fremont Power Co	.40
Mount Konacti Light & Power Co	2.66
Southern Sierras Power Co	1,500.00
Frank G. Baum	450.00
Montana Power Co	316.06
Elko-Lamville Power Co	35.00
Ruby Gulch Mining Co	70.00
Nevada Valleys Power Co	200,00
Coachella Valley Ice & Electric Co	130.00
Keating Gold Mining Co	70.00
Utah Power & Light Co	1,780.00
United Verde Copper Co	5.00
Glenwood Light & Water Co	20.00
Colorado Power Co	400.00
Pacific Power & Light Co	25.00
	$8,407.33

During the past year 44 applications for permit were received, as against 24 the previous year.

POWER SITE AND PUBLIC WATER RESERVES.

Withdrawals of public lands found to be valuable for power purposes, under the act of June 25, 1910 (36 Stat., 847), as amended by the act of August 24, 1912 (37 Stat., 497), and the act of June 25, 1910 (36 Stat., 855), such withdrawals being in consonance with the policy of the Government relative to the creation and distribution of electrical energy, is worthy of comment. Elsewhere in this report will be found tables showing details of such withdrawals.

During the past year 156,353 acres were withdrawn by 83 orders, as against 161,973 acres by 44 withdrawals the previous year.

A careful analysis of these figures would appear to indicate that more care is being taken to determine the character of the land than has been the case heretofore. About 5,000 acres less was withdrawn this year by nearly twice as many orders. Seventy-nine thousand nine hundred and eight acres, theretofore withdrawn, were restored to entry, as against 26,807 acres the previous year. These restorations were made by 29 orders, as against 30 the previous year.

Especial attention is called to the so-called "water-hole" withdrawals, which are made under the same acts. It is the endeavor of the department to withdraw all smallest legal subdivisions upon

which public springs or other water is found in portions of the country which may be classed as strictly desert in character, and where the acquisition of the land containing such springs or other water by individuals or corporations would create a monopoly of the waters of the range appurtenant thereto. Such withdrawals hold the waters forever open to the public. The small stockman as well as his big competitor is entitled to the use thereof, and the liability of large public ranges passing into the control of single interests by reason of the monopoly of available water is minimized. During the past year 15 " water-hole " withdrawals have been made, aggregating 11,934 acres, and 4 restorations have been approved, covering 3,498 acres. Congress expressly approved of this policy in the act of December 29, 1916.

June 30, 1917, 201,708 acres appear withdrawn for public water reserves, as against 193,273 acres the previous year.

On the same date there were 2,429,097 acres withdrawn for power purposes, as against 2,352,652 acres the previous year.

The total withdrawals under the act, including power and water-hole withdrawals, is 2,630,805 acres, as against 2,545,924 acres last year.

THE CAREY ACT.

A general tendency among the States which have Carey Act segregations to prune out the lands which are not susceptible of irrigation, or are of doubtful feasibility either because of lack of water, engineering difficulties, or lack of adequate financial support, is becoming more manifest.

While, during the past year, restoration for expiry or on relinquishment did not begin until about July, owing to the fact that the new regulations governing restoration were not approved until late in the year, no less than 132,074.25 acres of segregated or withdrawn land have been restored to homestead and other forms of entry.

Many other relinquishments by various States are on hand, and the lands involved are being restored as rapidly as possible.

The restorations effected during the year are as follows:

List No.	State.	Land office.	Serial.	Area.	Subject to homestead entry (date).
1	Arizona	Phoenix	026054	15,030.76	Aug. 30, 1917
42	Colorado	Glenwood Springs	07203	26,474.51	July 16, 1917
12	do	do	03746	3,443.35	Sept. 4, 1917
3	do	do	03065	14,027.02	Do.
15	do	do	03672	1,800.00	Do.
6	Idaho	Hailey	07529	341.55	Sept. 6, 1917
46	do	Blackfoot	05116	2,160.00	Do.
45	do	Hailey	07231	6,197.64	Aug. 20, 1917
73	do	Blackfoot	022342	19,107.36	July 16, 1917
23	do	Hailey	0307	3,240.70	Aug. 27, 1917
6	Utah	Vernal	02588	40,251.36	Sept. 10, 1917
		Salt Lake City	05048		
	Total			132,074.25	

Withdrawal applications under the Carey Act to the amount of 85,833.23 acres have been received and disposed of by approval.

Segregation applications for 13,616.60 acres have been received and 14,583.19 acres disposed of, considerably cutting down the pending figures.

About 126,000 acres of segregated land has come up for some form of action during the year. Of this, 27,000 acres have been finally disposed of, leaving 99,000 acres still pending and awaiting some action elsewhere.

Applications for patent, alleging completion of the enterprises, have been received totaling 47,926.93 acres, and patents have been issued for 43,184.83 acres.

With the ending of the present field season, it is expected that a number of important reports will be received from the Carey Act inspectors, and it is believed that next year will find the Carey Act in a much more satisfactory condition.

DESERT LAND ENTRIES.

Under the provisions of the act of March 3, 1877 (19 Stat., 377), desert entries could be made for lands of the character contemplated by the desert-land law for as much as 640 acres. Under the amendatory act of March 3, 1891 (26 Stat., 1095), the maximum area was reduced to 320 acres. Where lands have been shown to be valuable for coal, phosphate, etc., by supplemental acts, the area embraced in such entries has been limited to 160 acres. In my last year's annual report, reference was made to House bill No. 12710, Sixty-fourth Congress, by which it was further proposed to reduce the area in all cases to 160 acres, which met with departmental approval, and for reasons stated in such report, the recommendation is renewed.

Under the last two paragraphs of section 5 of the act of March 4, 1915 (38 Stat., 1161), provision was made for the perfecting of desert-land entries where water was not available for reclamation of the land, either in the manner required of homestead entrymen or by purchase in cases of entries made prior to July 1, 1914, and which were assigned prior to the date of the passage of the act.

On July 1, 1916, there were pending 844 applications for relief under the said act of March 4, 1915; during the fiscal year ending June 30, 1917, 3,765 of such applications were received, making 4,609 of such pending and received cases; of this number, 57 were rejected; 531 are outstanding in which additional evidence in support of the applications have been called for; and 2,910 in which the applications for relief have been allowed. There are pending un-

disposed of 1,108 cases, but of this number only 221 are being held for office action, the remainder being suspended or held for future action because the entries involved are within irrigation districts or projects upon which reports have not been received, and until such reports are received and acted upon, the applications can not be consistently passed upon. In all, 5,590 relief cases have been disposed of since the passage of the act.

During the present fiscal year there were patented 1,752 desert-land entries, covering an area of 277,432.33 acres; 1,372 original and 97 final desert-land entries were canceled.

DESERT-LAND ENTRIES IN CALIFORNIA.

Outside of Imperial Valley, Owens River Valley, and part of the Palo Verde Mesa, nearly all desert-land entries in California are made with a view to irrigating the lands by means of water to be obtained from wells sunk on the lands, and thousands of desert-land entries have been made under these circumstances for lands in the Coachella Valley, Mojave Desert, San Joaquin Valley, and in small valleys and plateaus in the eastern part of the State by persons who apparently had very little information regarding the possibility of obtaining water from wells, the cost, or amount of water necessary to insure reclamation. As a result it has been necessary to grant to many of these claimants the privilege of obtaining title to these arid and nonirrigable lands by compliance with the relief act of March 4, 1915 (38 Stat., 1161).

It is now the practice to investigate in the field the source of water supply and the feasibility of the plans, alleged in a desert-land application, and if there appears to be no reasonable prospect that the land can be reclaimed, the application is rejected. The few appeals from this action would indicate that the information obtained by the field service is appreciated by the desert-land applicants, and that large sums of money are thus saved to these people, which would otherwise be wasted in a vain attempt to reclaim the lands.

SALE OF "10-CHAIN" LOTS IN IMPERIAL COUNTY, CAL.

During the past fiscal year, 183 applications were filed to purchase lots, 10 chains or less in width, in Imperial County, Cal., under the act of March 3, 1909 (35 Stat., 779), and pursuant to the regulations of May 13, 1916. Original action has been taken on all of these applications, and up to July 1, 1917, there were approved for patenting 70 applications, involving a purchase price of $8,531.80. It is anticipated that the pending applications will increase this sum to about $20,000.

IRRIGATION PROJECTS.

Prior to the instructions of September 30, 1910 (39 L. D., 253), this office was not in a position to take intelligent action on desert-land entires alleging irrigation companies as source of water supply. Before the promulgation of these regulations cases were considered without positive knowledge as to the feasibility or nonfeasibility of the systems relied upon by the claimants, and consequently it was essential that provision be made for their investigation. In the past fiscal year approximately 121 new reports have been received, making a grand total of 851 reports since the regulations were adopted.

While these reports are made primarily for the protection of the interests of the Government, they also serve as a protection to public-land claimants, in that they tend to discourage the promotion of ill-advised schemes. The fact that all projects proposing the reclamation of desert lands will be made the subject of a rigid field investigation has become generally known, and it is the exception rather than the rule for projects to be undertaken without adequate advice as to construction problems, the sufficiency and permanency of the water supply, and the feasibility of the system from an economic and engineering standpoint. The data secured by the field examination are considered in connection with applications to make desert-land entries, annual and final proofs submitted thereon, and in applications for extension of time, and the relief provided for under the act of March 4, 1915 (38 Stat., 1161).

When conducting an examination the field officer makes a thorough study of all questions involved, and if his report is favorable it is transmitted by this office to the Geological Survey for consideration. This procedure gives the office a double check as to the merits of the enterprise, and the action subsequently taken is based on the best possible knowledge.

Approximately 130 reports on projects have been considered during the past fiscal year, divided as follows: Eighty-six favorable, involving 416 desert-land entries; 42 adverse, affecting about 969 desert-land entries; and 38 closed without any definite conclusion being reached, because no pending desert land entries appeared to be dependent on them.

The uncertainty of the ultimate source of water supply in any particular entry makes it impossible to give definite figures with respect to the actual number of entries involved.

IRRIGATION IN IMPERIAL COUNTY, CAL.

Practically all of the lands in the Imperial Valley proper which are susceptible of irrigation by gravity flow from the existing system of canals have been entered and are under irrigation, and it may be

stated that the maximum limit of the existing system in the United States has been reached. There are certain small extensions of the existing system under consideration, and the largest of these is the construction of a high-line canal by the Mount Signal Canal Co. along the western part of the valley for the irrigation of a strip from 2 to 3 miles wide between the western boundary of the Imperial irrigation district and the ancient beach line of the Salton Sea.

Lying above and between the east side high-line canal and the range of sand hills in the eastern part of Imperial County is a large area of land, approximately 250,000 acres, which was withdrawn from settlement and entry in connection with the Yuma reclamation project under the reclamation act of June 17, 1902 (32 Stat., 388), and while this land had been excluded from the Yuma project, it is of such an arid character that a public-land claimant could not enter it with a view to complying with the law in good faith, so that the withdrawal has been continued in hope that some means would be found to irrigate the land, either through public or private enterprise.

With the matter standing thus, a proposition was submitted to the department by the Imperial Laguna Water Co. to irrigate this mesa land by means of a canal, diverting water from the Colorado River at the Laguna Dam of the Yuma reclamation project, and on July 6, 1917, the Secretary of the Interior entered into a contract with said company under authority of the act of February 21, 1911 (36 Stat., 925), by which such connection with the Laguna Dam will be permitted on the performance of certain conditions prior thereto, the principal one of which consists in submitting to the Secretary of the Interior a satisfactory showing based on the reports of civil engineers as to the feasibility of the project. The contract contemplates full protection to all interests of the Yuma reclamation project, both present and future, as well as those of the future settlers on the mesa, should the enterprise be ultimately carried into execution and the lands opened to entry.

STATE SELECTIONS AND STATE GRANTS.

During the past year 691,831.20 acres of indemnity school-land selections and 542,094.81 acres of selections under grants in quantity for specific purposes received departmental approval. The major portion of this land (1,233,926.01 acres) doubtless is now in private control through lease or sale by the several States and actively adding to the material welfare of our people. In addition to the approvals, as above noted, 26,268.95 acres of school selections and 8,167.15 acres of specific grant selections were canceled, the acreage finally adjudicated aggregating 1,268,962.11. During the fiscal year 1916,

1,145,167.02 acres of State selections were finally adjudicated, and 950,830.13 acres during 1915.

That the States are active in the assertion of claims to public lands under congressional grants is evidenced by the fact that 846,284.64 acres of indemnity school-land selections and 800,445.86 acres of quantity grant selections were made during the past year.

THE DESERET DECISION.

The act of Congress approved February 28, 1891 (26 Stat., 796), amending sections 2275 and 2276, United States Revised Statutes, was construed by the Federal Land Department for a number of years as affording full authority for the exchange of lands in designated school sections, whether surveyed or unsurveyed, within reservation boundaries, for other lands. Federal and State courts, however, reached a different conclusion (see in this connection Hibbard *v.* Slack, 84 Fed. Rep., 571; State of Washington *v.* Whitney, 120 Pac. Rep., 116; and Balderson *v.* Brady, 17 Idaho, 567), in view of which it was determined in 1913 to suspend action on indemnity school-land selections representing exchanges of the character indicated pending remedial legislation or a decision of the court of last resort. As indicating the seriousness of the situation, it may be stated that exchanges had been consummated involving upward of 800,000 acres of surveyed and 1,600,000 acres of unsurveyed school-section lands within the boundaries of national forests; that such claims aggregating upward of 1,000,000 acres were pending and new claims being constantly filed. The doubt and uncertainty which had arisen, and with good cause, was removed by decision of the Supreme Court of the United States, March 26, 1917, in the case of the State of California *v.* Deseret Water, Oil & Irrigation Co., upholding the former decisions of the Department, and pending exchange selections are now being adjudicated as rapidly as may be, due regard being had, of course, to other claims to public lands. It is hoped a good showing can be made during the next fiscal year.

THE CALIFORNIA ADJUSTMENT.

The school grants of the public-land States are adjusted by townships and as to particular townships it is sometimes found that a State has received indemnity lands to which it is not entitled. The State is then requested to make good the overdraft.

One such case is that of the State of California, one of long standing, and while details remain to be worked out the major portion of the adjustment, in so far as claims against the State are concerned, was concluded during the past year.

The matter was somewhat complicated by provisions of the act of March 1, 1877 (19 Stat., 267), declaring confirmation of certain selections of the State of California; providing that certain lands in sections 16 and 36 should "be disposed of as other public lands of the United States," and for the purchase from the United States of certain lands theretofore selected by and certified to the State.

Claim was first asserted against the State in 1903. The department, November 7, 1905 (34 L. D., 270), directed that pending adjustment of the matter of excess certifications or until further directions were given no selections be approved nor lands be certified to the State on account of the school grant. Further claims were asserted in 1907 and 1908, and while a patent or deed of conveyance from the State to the United States conveying title to 12,000 acres of granted school-section land within national forest boundaries, in partial adjustment, was accepted by this office February 14, 1910, a practical, workable agreement was not reached until June 16, 1911, after repeated conferences between representatives of the State and the Land Department. The agreement or "basis of adjustment" is as follows:

(1) That there be paid to the United States, as under the provisions of the act of Congress approved March 1, 1877 (19 Stat., 267), $1.25 per acre in satisfaction of all excess certifications of indemnity school lands which occurred prior to the date of approval of said act, and for which said lands no payment has, as yet, been made to the United States.

(2) That new and valid bases be designated by the State for all selections that have been or may be approved, made on basis of lands in sections 16 and 36, claimed or reported to be mineral in character, or embraced in forest or other reservations, and wherein such base tracts have been, or may be, sold or encumbered by the State; provided, however, that new base need not be designated in any case wherein the United States has disposed of, by patent, the tract in lieu of which indemnity was claimed and granted.

(3) That new and valid bases be designated by the State for approved selections in all cases wherein there have been, or may be, excesses in certifications occurring since March 1, 1877.

(4) That lands in sections 16 and 36, which, under the provisions of the act of Congress approved March 1, 1877 (19 Stat., 267) are the property of the United States, and which have been sold or encumbered by the State, are to be selected by the State, it being understood that the requirements of publication of notice and the filing of nonmineral affidavits in support of such selections be waived by the land department of the United States.

(5) That the State of California will enact such additional laws as may be necessary to carry into effect the plan of adjustment herein contained, and the land department of the Federal Government will favor and will use its good offices to have passed and approved such legislation by Congress as may be necessary to consummate such a plan.

(6) That the land department will immediately proceed with the listing of all selections made by the State where the base is free from objection and the lands applied for are subject to selection by the State: *Provided*, The governor of the State of California shall first agree to specify and state in a call or

proclamation for a special or extraordinary session of the State legislature, to be made and held sometime during the year 1911, as one of the purposes for which the legislature is so convened, the subject and consideration of such legislation as may be required to consummate the within plan of settlement: *And provided further*, That if such necessary laws be not enacted at such special session the plan of adjustment herein contained may be deemed without force and effect.

Thereafter necessary legislation was enacted (pars. 5 and 6) and the records of the General Land Office were checked by employees of the State and the records of the State land office by representatives of the General Land Office, with the following results:

Paragraph 1. Payment for 18,208.29 acres of land, amounting to $22,760.36.

Paragraphs 2 and 3. Patents or deeds of conveyance from the State to the United States as designations of new and valid bases amounting to 14,001.74 acres, which, with the 12,000 acres theretofore conveyed, amounts to 26,001.74 acres.

Paragraph 4. Transferees of the State protected to the extent of 7,190.42 acres.

Paragraph 6. Adjudication of pending indemnity school-land selections is proceeding, the acreage confirmed to the State between June 16, 1911, and June 30, 1917, being 167,745.15.

For several years past officials of the State of California have cooperated most heartily and effectively in securing this adjustment.

SWAMP AND OVERFLOWED LANDS.

Under the grant of swamp and overflowed lands made by the acts of Congress approved March 2, 1849 (9 Stat., 352); September 28, 1850 (9 Stat., 519); and March 12, 1860 (12 Stat., 3), now sections 2479, 2480, 2481, and 2490, United States Revised Statutes, patents issued last year to seven States for 22,585.48 acres. Applications for the identification of 57,795.10 acres as swamp were rejected. New claims for 3,027.31 acres were filed.

Up to June 30, 1917, lands have been patented to the several States under this grant, as follows:

	Acres.		Acres.
Alabama	418, 520. 14	Minnesota	4, 662, 727. 10
Arkansas	7, 686, 175. 37	Mississippi	3, 284, 360. 08
California	2, 115. 416. 89	Missouri	3, 346, 664. 51
Florida	20, 201, 441. 74	Ohio	26, 251. 95
Illinois	1, 457, 399. 20	Oregon	264, 029. 01
Indiana	1, 254, 270. 73	Wisconsin	3, 251, 502. 34
Iowa	873, 816. 42		
Louisiana	9, 734, 894. 58	Total	63, 873, 159. 62
Michigan	5, 655, 689. 56		

In addition to this immense area, the swamp-land States received, as detailed in my report of last year, $2,095,468.79 as cash indemnity for swamp lands sold to settlers before March 3, 1857, and 743,-939.39 acres of land (which land, presumably, was of the best then

subject to selection) as indemnity for swamp lands located with military bounty land warrants or scrip prior to the same date. This indemnity was given under the acts of March 2, 1855 (10 Stat., 634), and March 3, 1857 (11 Stat., 251), now sections 2482, 2483, and 2484, United States Revised Statutes.

For the reasons stated in my last annual report, I renew my recommendation that legislation be enacted declaring that, after a date fixed, preferably six months after the passage of the act, no new claims to public lands as swamp or overflowed be received or recognized by the Land Department.

INDIAN ALLOTMENTS.

Marked progress has been made in setting aside individual holdings for Indians, and during the past year 5,839 trust patents, embracing 945,874.73 acres, were issued to Indians. This is an increase of 439,913.01 acres, or nearly 87 per cent, over the preceding year, during which 3,568 trust patents, embracing 505,961.72 acres, were issued. The increasing capability of the Indian to manage his own business is indicated by the number of trust patents transmitted into fee patents. During the past year 2,014 patents in fee, embracing 246,230.16 acres, were issued to Indians found competent to assume charge of their own affairs, and to purchasers of allotted lands, as compared with 2,298 such patents, embracing 300,391.71 acres, issued the previous year.

A new circular concerning the procedure to be followed in the allowance of Indian allotments has been prepared and is under consideration. It is intended to determine therein just when the allotment application segregates the land and gives the Indian the prior right thereto. About 500 allotment applications are suspended pending the approval of this circular.

REPAYMENTS.

The existing laws governing repayments, section 2362, United States Revised Statutes, act of June 16, 1880 (21 Stat., 287), and the act of March 26, 1908 (35 Stat., 48), provide for the return of moneys covered into the Treasury of the United States received in connection with the disposal of the public lands, to be repaid to the entryman, his heirs or assigns or his legal representatives, in the absence of fraud on their part, in all cases where lands have been erroneously sold; where money has been paid by innocent parties on fraudulent and void soldiers' and sailors' additional homestead entries; where entries were canceled for conflict; where entries are erroneously allowed and can not be confirmed; where applications to make entry, filing, selection, etc., are rejected; and where any amount has been paid in excess of the legal requirement.

Under said laws there were stated during the last fiscal year 1,215 accounts, allowing repayment of $106,888.42, and during said period there were denied 434 claims for repayment. This number of claims allowed and the amount repaid includes four accounts, allowing repayment of $4,753.66, being moneys received in connection with then pending claims for coal lands in Alaska and repaid in pursuance of section 3, act of October 20, 1914 (38 Stat., 741).

Repayment claims, allowed and denied, by years.

Year.	Claims allowed.	Amount.	Claims denied.
1911	2,338	$178,437.02	712
1912	2,097	178,952.15	619
1913	2,427	217,614.09	644
1914	1,775	123,139.11	482
1915	1,689	305,310.83	799
1916	1,700	218,971.46	940
1917	1,215	106,888.42	434

PRIVATE LAND CLAIMS.

In the several treaties and agreements by which the public domain of the United States has been acquired, provision has been made for the confirmation and fulfillment of the obligations of the former government for unperfected claims to land. In the earlier legislation in connection with the Northwest Territory, the Louisiana Purchase, and the Florida Cession, complete grants, evidenced by patent or grant prior to the date of cession, were recognized as valid under the terms of the treaty, and commissioners were authorized to confirm such titles as were found of record or among the archives of the foreign government and such as were presented by claimants and their authenticity established. The United States, having obligated itself to make good outstanding obligations to the extent specified in the several treaties, the territory acquired under each treaty has formed the basis for a series of special acts of Congress limited in their operation to a particular district or territory, and these rights are known as private land claims.

Inquiries are frequently addressed to this office by persons claiming as heirs of persons who have received or alleged to have received concessions from foreign governments. Applications for patents where patents have not issued are also received from persons desiring to establish title to the land involved.

The statement is often made in letters to this office that a tract of land has never been assessed for taxes because it is within a private land claim on which no patent has issued. The Supreme Court of the United States, in the case of Wilson Cypress Co. *v.* Marcos (236 U. S., 635), has held that such claims are subject to taxes from the time of their segregation from the public domain after confirmation, re-

versing the court of appeals. If the views held by the lower court in the case referred to are those prevailing to any considerable extent in the States where private land claims form a large proportion of the taxable land in the State, considerable revenue has been lost and will be lost to the localities until a thorough understanding of the title by which these lands are held prevails.

On the other hand, lands for which a claim has not been confirmed are assessed for taxation and even form the subject of barter and sale by persons claiming to hold title to the land. Some of these alleged claims have been exploited to the injury of innocent persons, such as the Don Carlos Beales claim for 60,000,000 acres in western Texas and eastern New Mexico, and the Joseph Villiers claim for 3,000,000 acres in Arkansas and Missouri. As each of these cases depends largely on its own facts, in case of doubt the records of this office should be examined.

NATIONAL FORESTS.

Since the issuance of the last annual report one national forest has been enlarged and 14 reduced under the act of June 4, 1897 (30 Stat., 34, 36), 5 have been enlarged under special acts of Congress, the additions so made aggregating 609,497 acres, and by the act of August 9, 1916 (39 Stat., 442), a portion of the Lassen National Forest, in California, was set apart as the Lassen Volcanic National Park, and the act of February 14, 1917 (39 Stat., 916), added a portion of the Colorado National Forest, in Colorado, to the Rocky Mountain National Park. Certain interforest transfers have been made, and the Bonneville has been consolidated with the Washakie National Forest, in Wyoming.

There are now 152 national forests, embracing 176,252,160 acres, of which approximately 87 per cent is public land. The net increase in national forest area since the beginning of the fiscal year is 311,809 acres. During the fiscal year 437,461 acres have been excluded from national forests and the public lands, subject to disposition in 353,788 acres thereof, and in 320 acres released from temporary forest withdrawal have been restored to settlement and entry.

During the fiscal year 8 administrative stations, embracing 1,218 acres, have been withdrawn by Executive orders under the act of June 25, 1910 (36 Stat., 847), for use by the Forest Service in the administration of the national forests, and 117 withdrawals for such purpose have been revoked, covering 22,318 acres, and 10 withdrawals for rights of way for wagon roads have been revoked. There are now 17 rights of way for wagon roads and 1,322 administrative sites withdrawn, embracing 259,841 acres—161 sites, covering 19,809 acres, being near, and 1,161 sites, covering 240,032 acres, in the national forests.

CONTESTS IN THE GENERAL LAND OFFICE.

The contest division of this office is the special forum in which are adjudicated those cases arising in the administration of the public lands, which involve litigation such as can only be properly determined upon testimony, taken under the rules of evidence ordinarily applicable to cases of analogous character in the courts. Such litigation arises out of disputed questions of law and fact (1) between rival claimants for the same tract of land; (2) between entrymen and other claimants on the one hand and on the other contestants seeking cancellation of the existing entries or claims and a preference right to enter the lands involved; (3) upon charges preferred by our field service alleging illegality or failure to comply with the law; and (4) upon similar charges preferred by the Forest Service as to lands under their supervision.

The gradual reduction in the area of the public domain appears to be accompanied by a correspondingly increased degree of strife and rivalry to acquire title thereto, so that not only is there but little decrease in the number of contest cases received in this office on appeal from the local offices but a greater mass of testimony is introduced, and by reason of objections, motions, and briefs the records often contain intricate and perplexing complications. The greater number of cases decided in the contest division arise under the homestead and desert land laws, but that division now passes upon litigation affecting nearly every variety of claims under the public-land laws.

In the year ended June 30, 1917, this division has disposed of 1,063 litigated cases, and in this particular the work is practically up to date.

Not all contests filed result in hearings, as many entries are canceled under the rules of practice for default of the entryman in not serving and filing answer to contest charges, and many contests are dismissed for failure of prosecution by the contestant. During the past year 4,977 contests were disposed of in one or the other of these two ways, and the work in this class of cases is now current.

AGRICULTURAL ENTRY OF COAL LANDS.

So acute is the demand for suitable lands for homestead purposes that the prospective settlers have turned their attention to lands classified as coal in Indian reservations. Congress in providing for the opening of these lands has usually stipulated that the mineral lands shall be disposed of under the mineral-land laws. To meet the popular demand for the opening of the coal lands mentioned, Congress passed the act of February 27, 1917 (39 Stat., 944), which authorized the allowance of agricultural entries for lands

withdrawn or classified as coal lands or valuable for coal deposits in Indian reservations which have heretofore or may hereafter be opened to settlement and entry. Such lands are to be subject to the same disposition as is prescribed by law for the nonmineral lands, including the classification and appraisement of the lands and the payment of an appraised price by the entryman and with a reservation to the United States of the coal deposits in the land and of the right to prospect for, mine, and remove the same.

Among the coal lands which have been specifically opened by President's proclamations under this act are lands in the Fort Peck, Crow, and Fort Berthold Indian Reservations.

COAL LANDS IN FORT BERTHOLD INDIAN RESERVATION.

By President's proclamation of April 7, 1917, 9,206.08 acres in sections 16 and 36 in the Fort Berthold Indian Reservation, N. Dak., which had been classified as coal lands, were opened to homestead entry, as provided in the act of March 3, 1917 (39 Stat., 1131). The entrymen are required to pay an appraised price ranging from $3 to $10 per acre, and the patents are to contain a reservation to the United States of any coal in the lands. One thousand and ninety-six applications for these lands were received between April 20 and 30, 1917, covering all but 960 acres of the lands opened, and at the drawing held at the United States land office at Minot, N. Dak., May 3, 1917, awards were made of all of the lands applied for.

FORT PECK COAL LANDS.

The situation with regard to Fort Peck coal lands is complicated. Lands in said reservation were classified and appraised under the act of May 30, 1908 (35 Stat., 558), by an appraisement commission. The commission returned certain lands as mineral and subject to entry under the coal-land laws and other lands as nonmineral and appraised the same for their agricultural value. Subsequently some of the latter lands were classified as coal lands by the United States Geological Survey, and a coal price fixed for the land. These coal lands were held to be subject to disposal under the coal-land laws, and not subject to homestead entry under the act of June 22, 1910 (36 Stat., 583), for the reason that the act of 1908 provided that the mineral lands should not be appraised. The local officers erroneously allowed 90 homestead entries of these coal lands which had also been appraised for their nonmineral value. By President's proclamation of March 21, 1917, these entrymen were allowed to perfect title to the lands, subject to the provisions of the act of February 27, 1917, which gives them only a surface right.

Certain other applications were filed for Fort Peck coal lands prior to November 19, 1916, the date the local officers were instructed these coal lands were not subject to entry, which applications were not covered by said proclamation of March 21, 1917, and by proclamation of April 28, 1917, these applications were allowed, where the lands had been classified and appraised as agricultural, grazing, or arid, subject to the provisions of said act of February 27, 1917. The remaining coal lands, classified and appraised as agricultural, grazing, or arid, were opened to homestead entry on May 8, 1917, by said proclamation, surface rights only to be acquired by such entry.

Fort Peck coal lands not classified and appraised without regard to the coal deposits are not to become subject to settlement or entry under agricultural laws until so provided by further proclamations.

On May 12, 1917, the department gave full consideration to the status of coal-land entries and applications for Fort Peck lands and held (*a*) that applications for land returned by the appraisal commission as coal, in which the price fixed in the coal-land laws was paid by the applicant prior to the passage of the act of February 27, 1917, should be approved and patented in the absence of other objection; (*b*) applicants for land returned as coal, but in which the price fixed in the coal-land laws was not paid prior to the passage of the act of February 27, 1917, must pay both the price fixed in the coal-land laws and the appraised price to be established under the act of February 27, 1917; (*c*) that applicants for land returned by the appraisal commission as nonmineral, but classified by the Geological Survey as coal, and in which merely the price fixed in the coal-land laws was paid prior to the withdrawal of these lands by the President on February 15, 1917, made pending legislation, should be required to pay both the price fixed under the coal-land laws and the appraised value as fixed by the appraisal commission; and (*d*) coal-land applicants for lands returned by the appraisal commission as nonmineral, but classified by the Geological Survey as coal, in which no payment was made prior to the withdrawal order of February 15, 1917, must likewise pay both prices. Furthermore, it was held that thereafter all coal applicants for lands in the Fort Peck Reservation who desire to obtain title to both the surface and the coal deposits must pay the prices fixed in the coal-land laws and the appraised value fixed by the act of May 30, 1908, or to be fixed under said act of February 27, 1917.

COAL LANDS IN CROW RESERVATION.

Lands in the Crow Indian Reservation, Mont., classified as coal lands, were entered under the homestead laws as provided in the act of June 22, 1910 (36 Stat., 583), in accordance with a decision of

the department rendered January 20, 1911, in the case of William Glassner (39 L. D., 462). Entries made under said act were limited to surface rights, and entrymen were required to pay $4 per acre for the land entered, the price fixed in the law opening the agricultural lands to entry. The price of nonmineral Crow lands was reduced by President's proclamation of September 28, 1914, to $3 per acre where the lands were entered prior to September 15, 1915, and $2 per acre if entered on or after that date, and the local land officers erroneously allowed surface entries for Crow coal lands at the reduced price as if made under said President's proclamation. On April 6, 1917, a proclamation was issued allowing the entrymen, whose entries for said coal lands were made as under said proclamation of September 28, 1914, to perfect their entries upon compliance with the requirements of said proclamation, subject to the provisions of the act of February 27, 1917; the price of the land to be $3 per acre, if entered or purchased prior to September 15, 1915, and $2 per acre if entered or purchased thereafter. Said coal land continued subject to disposal under said proclamation at $2 per acre until June 30, 1917.

BRINE DEPOSITS OF POTASH.

The residual deposits of an ancient lake belonging to an early geologic period and now known as Searles Lake, in Inyo and San Bernardino Counties, Cal., contain the only extensive potash deposit known to exist in the United States.

The deposit, as it now occurs, occupies the lower or central part of the former lake bed, embracing some 6,000 to 7,000 acres, with a saline body of complex structure, from 60 to 80 feet in depth, which permits a free flow of saturate brine, composed of muriate of potash, soda ash, sodium sulphate, common salt, and borax, mixed with water and other compounds not regarded as commercially valuable. Outside of and surrounding this crystalline body, subject to overflow in the wet season, is a beach a mile or more in width containing so-called trona reefs heretofore exploited for the soda and borax contained therein.

The watershed immediately tributary to Searles Lake is approximately 600 square miles in area. Inflowing drainage waters which cover the central crystal body, and sometimes also the surface of the mud belt of Searles Lake, during occasional rainstorms occurring in the rainy season form a brine saturated principally with the common salt found on the surface, which remains separate and distinct from the heavier brine beneath. This surface brine soon evaporates, leaving the common salt as the exposed or upper crust of the crystal body.

Questions involving the quantity and extent of the inflowing waters, the amount of additional mineral brought down in solu-

tion, and the extent to which the crystals would be dissolved, or the brine weakened by inflowing waters, if the original brine were constantly pumped out are problematical and have not been determined. It is known, however, that the main volume of brine is so completely saturated with the salts of the same character as those making up the entire body that it can dissolve nothing more of the minerals carried in solution.

It is estimated that a daily removal of 2,000,000 gallons of the brine would draw from the lake approximately one-tenth of an inch per day. The natural evaporation which is held in check at a practically constant level by the inflowing waters from the drainage basin is much larger, varying from one-quarter to one-half inch per day.

The entire area as above described is held at the present time under purported placer locations, for whose benefit applications for patent are now pending before the department, but against which proceedings have been directed by the department charging invalidity of said claims.

The deposit is a very large and valuable one, estimated in value at many millions of dollars, and is claimed to be the only potash body of substantial proportions known at present in the United States. The deposit being in the nature of a brine and susceptible of extraction by pumping process, it is very evident that a single individual or corporation if given a patent or lease and permitted to select, without restriction, the location thereof, could, by placing his claim in the lower or central part of the lake, monopolize the entire deposit; hence the importance of the proceedings now pending as to the validity of the claims at present asserted thereto.

CHANGE IN METHOD OF RESTORATION OF SEGREGATED OR WITHDRAWN LANDS.

Since the issuance of the last annual report a change has been made in the method of restoring segregated or withdrawn lands, owing to difficulties experienced under the former practice in determining priority in conflicting settlement claims where such lands have been restored to settlement in advance of entry. The department, in view of the provisions of the act of September 30, 1913 (38 Stat., 113), which authorizes the exercise of a wide discretion as to methods that may be employed in opening lands that have been segregated or withdrawn, and to the end that persons actually seeking a home on the public lands should have a preference over others in such restorations, issued instructions, on May 17, 1917, that have since governed the procedure in restorations under said act. These instructions provide that such lands, except where the laws or the

circumstances affecting the lands make it advisable to make other provisions, shall be restored to entry under the homestead laws seven days in advance of their restoration to settlement and other forms of disposition. Prospective applicants are permitted to execute their applications and present the same, accompanied by the required payments, to the proper local land office in person, by mail, or otherwise, within the 20 days next preceding the date on which the lands will become subject to entry of the form described in their applications. It is provided that all applications so filed, together with such as may be submitted at the hour fixed for restoration, will be treated as though simultaneously filed and disposed of as directed by the regulations of May 22, 1914, Circular No. 324 (43 L. D., 254).

THE LAND SERVICE BULLETIN.

It has often been a matter of comment on the part of former Commissioners of the General Land Office, as well as others familiar with the workings of the Land Department, that, due to the broad field of action covered by the activities of the service and widely separated offices and officers, through whom the administration of the public land laws is transacted, it is difficult to secure the desired concert of action and uniformity of policy embracing both the field and office service. True, the publication of the land decisions, as well as the issuance of circular regulations and instructions, do serve in a general way to advise the public land service as to the proper construction of the public land laws and methods of procedure thereunder, yet this is not all of the information which should be in the hands of both the local offices and the field service as to current affairs at headquarters.

To bring about a more thorough and up-to-date understanding in the entire land service of the general work and purposes of the Land Department, I have, since March 1 of the present year, issued monthly the Land Service Bulletin. This publication, limited at present to 300 copies, printed by mimeographic process, is prepared under my immediate direction, so that the primary purpose of the paper may always be kept in view, and goes to all the local land offices, surveyors general, supervisor and assistant supervisors of surveys, and field divisions, to form a permanent file in such offices for future reference.

The contents of the Bulletin are made up of items showing the transaction of current business in the land service, notes of important decisions rendered in the department and in the courts with respect to public land questions, legislation recently enacted or pending, and changes in personnel, with editorial comment on such matters as it is

deemed advisable to bring to the general attention of the land service.

If, prior to this experiment, I had any doubt as to the necessity and value of some publication of this character, such doubt no longer exists. The general interest manifested in the new publication throughout the public land service, and hearty cooperation to secure its success, is such as to assure me of its serving a most excellent purpose, even in its present limited method of publication and distribution.

From this experience I am satisfied that a publication on the same lines, placed on a permanent foundation, should become an established feature of the Land Department, and I therefore recommend that in our estimates for printing in the ensuing year due provision be made for a publication of this character.

NEW LEGISLATION.

Land locators.—Legislation recommended for a number of years by the department was finally enacted by Congress in the act of February 23, 1917 (Public, No. 348), entitled "An act to punish persons who make false representations to settlers and others pertaining to the public land of the United States." This act gives the General Land Office an effective weapon for dealing with a class of persons who have for many years preyed upon intending settlers. It is made a misdemeanor, punishable by a fine not exceeding $300 or by imprisonment for a term not exceeding one year, or by both, for any person, for a consideration paid or promised, to undertake to locate for an intending purchaser, settler, or entryman any public land of the United States, and willfully, and with intent to deceive, falsely represent that any tract of land is public land of a certain description.

Homestead entrymen or settlers.—The act approved July 28, 1917 (Public, No. 32), entitled "For the relief of homestead entrymen or settlers who enter the military or naval service of the United States in time of war," provides generally that in the case of any settler upon the public lands, or entryman whose application has been allowed, or is subsequently allowed, who enlists, or is engaged in the military or naval service of the United States during any war in which the United States may be engaged, shall have his military or naval service construed, in the administration of the homestead laws, as equivalent to residence and cultivation; that no contest shall be initiated on the ground of abandonment against such settler or entryman, unless it be alleged and proved that the absence from the land was not due to employment in the military or naval service; in the event of discharge on account of wounds received or disability incurred in the line of duty, then the term of enlistment shall be deducted from the required length of residence, without reference to

the time of actual service; no patent, however, to issue until the settler has resided upon and improved his homestead for a period of at least one year.

Section 2: If the settler or entryman dies while actually engaged in the military or naval service, then his widow, if unmarried, or, in case of her death or marriage, his minor orphan children, or his or their legal representatives, may at once make final proof upon such entry or application thereafter allowed, and shall be entitled to receive patent for such land; the death of the soldier while so engaged to be construed, in the administration of the homestead law, as equivalent to a performance of all requirements as to residence and cultivation upon such homestead.

Assessment work on mining claims.—The act of July 17, 1917 (S. J. Res. 33), provides that the terms of section 2324 of the Revised Statutes relative to assessment work shall not apply to claims owned by officers or enlisted men who may be mustered into the service of the United States during the present war; so that no mining claim or any part thereof owned by such person shall be subject to forfeiture for nonperformance of the annual assessments during the period of his service or until six months after his muster out or until six months after his death in the service. The claimant under any mining location, in order to receive the benefits of this law, must file a notice in the office where the location notice or certificate is recorded before the expiration of the assessment year during which he was mustered, giving notice of his muster into the service of the United States and of his intention to hold said mining claim under this act.

Desert-land entrymen.—The act of August 7, 1917 (Public, No. 36), entitled "For the protection of desert-land entrymen who enter the military or naval service of the United States in time of war," provides that desert-land entries made by members of the military or naval service prior to enlistment shall not be subject to contest or cancellation for failure to make annual improvements or effect the reclamation of the land during the period said entryman or his successor in interest is engaged in such service of the United States, or until six months thereafter; the time within which such entryman or claimant is required to make his expenditures or effect reclamation is to be reckoned exclusive of his actual military or naval service; the entryman or claimant must within six months after the passage of this act, or within six months after his muster into the service, file notice in the local land office of his muster into the service and of his desire to hold said desert-land claim under this act.

Nonresidence homesteads in Idaho.—The act of August 10, 1917 (Public, No. 40), amends section 6 of the act of June 17, 1910 (36 Stat., 531), providing for a nonresidence homestead in Idaho, to the

following effect: Whenever the Secretary of the Interior shall find any tracts of land in the State of Idaho subject to entry under this act do not have upon them a sufficient supply of water suitable for domestic purposes, so as to make continuous residence upon the lands possible, he may, in his discretion, designate such tracts of land, not to exceed in the aggregate 1,000,000 acres, and thereafter such lands shall be subject to entry without the necessity of residence; the entryman to cultivate not less than one-sixteenth of the entire area susceptible of cultivation during the first year, one-eighth during the second year, and not less than one-fourth during the third year of the entry and until final proof. After six months from the date of entry and until final proof the entryman to be a resident of the State of Idaho.

Agricultural entries on coal lands.—The act of February 27, 1917 (39 Stat., 944), authorizing agricultural entries on Indian lands classified as coal and opened to settlement and entry, is another recognition on the part of Congress as to the general demand for lands of an agricultural character.

PROPOSED LEGISLATION.

As noted in the foregoing, I am suggesting new legislation along the following lines:

1. An act authorizing the resurvey or retracement of public lands.
2. Fixing a period beyond which selections under the swamp-land grant will not be received.
3. Authorizing the consolidation of timberlands within the limits of the former Oregon & California Railroad grant as provided in Senate bill 2759 and House bill 5489.
4. Free survey of homesteads in Alaska.

The items of legislation suggested above may be regarded as in part additional to those recommended in detail in my last annual report, with the exception of the one relating to "land locators," which became a law, as stated herein.

FILING EQUIPMENT REQUIRED.

During April and May last the General Land Office, with nearly all of its files and equipment, was moved from the building between E and F and Seventh and Eighth Streets to the new Interior Department Building, occupying square No. 143, located between E and F and Eighteenth and Nineteenth Streets. The photolithographic township plat files, and the blue-printing plants are not yet removed from the old building. The work of the removal may be better understood when it is stated that the permanent files of closed

cases in the office, aside from the patent records, reach the figures of 10,000,000; live cases, 1,500,000; the law library, 4,500 volumes. All these, together with the office equipment for 500 clerks and employees were removed bodily from one part of the city and set down in another without any serious interference with the transaction of public business, excepting that due to lack of filing equipment and consequent loss of time used in searching among practically inaccessible files.

The files of this office are the muniments of title to the public lands disposed of during more than a hundred years, and are being constantly appealed to by persons seeking information therefrom for use in perfecting titles and litigation in the courts. This is evidenced by the fact that more than 89,000 copies of patents and records were made during the past year, to say nothing of numerous letters answered and examinations by attorneys. They are, therefore, of very great value and their removal involved careful handling to prevent, as much as possible, loss en route and misplacement on arrival, the latter, temporarily at least, being as bad as the former. All together, 628 van loads were removed, but owing to the urgent demand for the old building by the War Department, and almost total absence of equipment in the form of shelving, filing, and storage boxes in the new building a large portion of the files transferred were placed in huge piles on the ground and basement floors, where they still remain, eyesores and dirt accumulators, and largely inaccessible in the transaction of the business of the office. These inaccessible files cover approximately 11,000 square feet of floor space. The rough temporary wooden shelving which these files and the bound volumes of abstracts, press-copy books, patent records, and thousands of other volumes occupied in the old building was built into all sizes of rooms, corridors, nooks, and corners, and could not be removed except by being knocked to pieces. The further use of such broken and fragmentary old lumber in the new building was impracticable, but every effort is being made to utilize to the best advantage the various funds available for the purchase of new building equipment. These funds are as follows:

Out of the $100,000 appropriated by Congress—act making deficiency appropriations, approved April 17, 1917—for equipment expenses of the department in connection with the several bureau removals, the General Land Office was apportioned $19,300, and out of the $50,000 authorized by the same act to be used from unexpended balances of lump-sum appropriations for the several bureaus this office was apportioned $13,000. No other special funds have as yet been made available for equipment, but our regular apportionment from the department's contingent fund, which has always been inade-

quate for current expenses, has been made to help out a little. From the special funds, filing furniture has been ordered, as follows:

Steel storage sections, letter size, with bases, 3,347, of which 1,800 have been delivered. We need about 4,000 more.

Steel storage sections, cap size, with bases, 500; not yet delivered.

Steel book units for tract books, with bases, 312; bases only delivered.

Contracts for this material were entered into by the department on competitive bids at a total cost of $16,064.57, to be paid from the $19,300, from which also additional expenses amounting to $2,307.88 have been made for desks, chairs, wardrobes, and other necessary furniture, leaving a balance of $27.55 as yet unexpended.

One contract for 723 steel book units with bases, to be paid out of the $13,000 apportioned from the lump sum authorized by Congress, was let under competition by the department at a cost of $12,993.46, leaving a balance of $6.54 as yet unexpended. To house all of our patent records, 77 additional patent record book units with bases are needed. These records must remain upon the open wooden shelving temporarily provided until funds are available.

To further provide for housing the files of this office, 6,000 feet linear of open steel shelving, to be paid for out of building appropriation balances has been arranged for, but is not yet placed. Five thousand feet additional of this steel shelving will be needed.

It thus appears that present contracts and orders for filing equipment are inadequate to properly care for the patent and mineral records, pigeonhole files as yet not housed, and miscellaneous files of various kinds now piled upon the floors, and that at least $15,000 additional should either be approved or authorized to be expended out of lump sums as originally recommended for such equipment by this and the several bureaus interested. In addition to this sum, a further sum of $10,600 will be needed for specially constructed wooden shelving for the photolithographic township plat files still remaining in the old building. Recommendations for nearly all of these expenditures are included in the estimates for deficiency appropriations already submitted to the department.

With the files in their present condition it is impossible for us to get the full advantage of the facilities otherwise afforded by the new building. Moreover, we are seriously handicapped in giving the public proper service; this has been particularly noticeable in the case of the Federal land banks for which we have been unable, in numerous instances, to render as prompt service as desired.

THE CLERICAL FORCE.

Effort to keep the work in the General Land Office from falling in arrears is retarded through the loss of valuable employees, for whom we are unable to obtain substitutes through certification by the Civil

Service Commission because of the exhaustion of the eligible list or because other departments, with large lump-sum appropriations and supported by urgent necessity, offer much larger salaries for the same class of service than our statutory positions pay.

We have been authorized to employ, temporarily, persons qualified for stenographic and typewriting work, but even this class of ordinarily available persons is greatly reduced in numbers because of demand and competition for temporary as well as permanent employees. Indeed, it appears probable that the demand for temporary employees is the greater. A similar condition prevails in the case of employees desired for other than stenographic and typewriting work, and in general it may be stated that competition has become so strong for employees in all of the ordinary clerical occupations that the holding of a temporary employee under a low-grade statutory salary, even after he is sworn in, has become problematical—some department with a higher salary at its command wants his services and usually gets them.

I am unable to suggest a remedy for this condition other than that of equalizing the pay of Government employees for certain classes and grades of work, no matter in what department or bureau they are employed, nor whether payments are made from lump-sum appropriations or from salaries fixed by statute.

I am endeavoring to meet this condition to a certain extent in the estimates for 1919.

In closing, I beg to state that the General Land Office, though handicapped by continual loss of experienced employees, is straining every effort to meet the extraordinary demands placed upon it and to facilitate in all possible ways the substantial and well-ordered settlement and utilization of the public lands, believing that the more rapidly and effectively this can be done the greater will be the Nation's power and resources in the present world conflict.

Very respectfully,

CLAY TALLMAN, *Commissioner.*

The SECRETARY OF THE INTERIOR.

STATISTICS RELATING TO THE DISPOSITION OF THE PUBLIC DOMAIN.

Area of States and Territories.

[Based upon careful joint calculations made in the General Land Office, the Geological Survey, and the Bureau of the Census.]

State or Territory.	Land surface.		Water surface.		Total areas.	
	Sq. m.	*Acres.*	*Sq. m.*	*Acres.*	*Sq. m.*	*Acres.*
Alabama	51,279	32,818,560	719	460,160	51,998	33,278,720
Arizona	113,810	72,838,400	146	93,440	113,956	72,931,840
Arkansas	52,525	33,616,000	810	518,400	53,335	34,134,400
California	155,652	99,617,280	2,645	1,692,800	158,297	101,310,080
Colorado	103,658	66,341,120	290	185,600	103,948	66,526,720
Connecticut	4,820	3,084,800	145	92,800	4,965	3,177,600
Delaware	1,965	1,257,600	405	259,200	2,370	1,516,800
District of Columbia	60	38,400	10	6,400	70	44,800
Florida	54,861	35,111,040	3,805	2,435,200	58,666	37,546,240
Georgia	58,725	37,584,000	540	345,600	59,265	37,929,600
Idaho	83,354	53,346,560	534	341,760	83,888	53,688,320
Illinois	56,043	35,867,520	622	398,080	56,665	36,265,600
Indiana	36,045	23,068,800	309	197,760	36,354	23,266,560
Iowa	55,586	35,575,040	561	359,040	56,147	35,934,080
Kansas	81,774	52,335,360	384	245,760	82,158	52,581,120
Kentucky	40,181	25,715,840	417	266,880	40,598	25,982,720
Louisiana	45,409	29,061,760	3,097	1,982,080	48,506	31,043,840
Maine	29,895	19,132,800	3,145	2,012,800	33,040	21,145,600
Maryland	9,941	6,362,240	2,386	1,527,040	12,327	7,889,280
Massachusetts	8,039	5,144,960	227	145,280	8,266	5,290,240
Michigan	57,480	36,787,200	500	320,000	57,980	37,107,200
Minnesota	80,858	51,749,120	3,824	2,447,360	84,682	54,196,480
Mississippi	46,362	29,671,680	503	321,920	46,865	29,993,600
Missouri	68,727	43,985,280	693	443,520	69,420	44,428,800
Montana	146,201	93,568,640	796	509,440	146,997	94,078,080
Nebraska	76,808	49,157,120	712	455,680	77,520	49,612,800
Nevada	109,821	70,285,440	869	556,160	110,690	70,841,600
New Hampshire	9,031	5,779,840	310	198,400	9,341	5,978,240
New Jersey	7,514	4,808,960	710	454,400	8,224	5,263,360
New Mexico	122,503	78,401,920	131	83,840	122,634	78,485,760
New York	47,654	30,498,560	1,550	992,000	49,204	31,490,560
North Carolina	48,740	31,193,600	3,686	2,359,040	52,426	33,552,640
North Dakota	70,183	44,917,120	654	418,560	70,837	45,335,680
Ohio	40,740	26,073,600	300	192,000	41,040	26,265,600
Oklahoma	69,414	44,424,960	643	411,520	70,057	44,836,480
Oregon	95,607	61,188,480	1,092	698,880	96,699	61,887,360
Pennsylvania	44,832	28,692,480	294	188,160	45,126	28,880,640
Rhode Island	1,067	682,880	181	115,840	1,248	798,720
South Carolina	30,495	19,516,800	494	316,160	30,989	19,832,960
South Dakota	76,868	49,195,520	747	478,080	77,615	49,673,600
Tennessee	41,687	26,679,680	335	214,400	42,022	26,894,080
Texas	262,398	167,934,720	3,498	2,238,720	265,896	170,173,440
Utah	82,184	52,597,760	2,806	1,795,840	84,990	54,393,600
Vermont	9,124	5,839,360	440	281,600	9,564	6,120,960
Virginia	40,262	25,767,680	2,365	1,513,600	42,627	27,281,280
Washington	66,836	42,775,040	2,291	1,466,240	69,127	44,241,280
West Virginia	24,022	15,374,080	148	94,720	24,170	15,468,800
Wisconsin	55,256	35,363,840	810	518,400	56,066	35,882,240
Wyoming	97,594	62,460,160	320	204,800	97,914	62,664,960
	2,973,890	1,903,289,600	52,899	33,855,360	3,026,789	1,937,144,960
Alaska					590,884	378,165,760
Guam					210	134,400
Hawaii					6,449	4,127,360
Canal Zone					436	279,040
Philippine Islands					115,026	73,616,640
Porto Rico					3,435	2,198,400
American Samoa					77	49,280
Virgin Islands					138	88,320
Total					3,743,444	2,395,804,160

Owing to their location adjoining the Great Lakes, the States enumerated below contain approximately an additional number of square miles as follows: Illinois, 1,674 square miles of Lake Michigan; Indiana, 230 square miles of Lake Michigan; Michigan, 16,653 square miles of Lake Superior, 12,922 square miles of Lake Michigan, 9,925 square miles of Lake Huron, and 460 square miles of Lakes St. Clair and Erie; Minnesota, 2,514 square miles of Lake Superior; New York, 3,140 square miles of Lakes Ontario and Erie; Ohio, 3,443 square miles of Lake Erie; Pennsylvania, 891 square miles of Lake Erie; Wisconsin, 2,378 square miles of Lake Superior and 7,500 square miles of Lake Michigan.

In addition to the water areas noted above, California claims jurisdiction over all Pacific waters lying within 3 English miles of her coast; Oregon claims jurisdiction over a similar strip of the Pacific Ocean 1 marine league in width between latitude 42° north and the mouth of the Columbia River, and Texas claims jurisdiction over a strip of Gulf water 3 leagues in width adjacent to her coast and between the Rio Grande and the Sabine River.

United States district land offices, 98.

Locations.	Established.	Opened.
Alabama:		
Montgomery	July 10,1832	Jan. 1,1834
Alaska:		
Fairbanks	May 14,1907	July 1,1907
Juneau	Apr. 2,1902	June 20,1902
Nome	May 14,1907	July 1,1907
Arizona:		
Phoenix	July 25,1905	Oct. 2,1905
Arkansas:		
Camden	Jan. 10,1871	Mar. 20,1871
Harrison	July 1 ,1870	Feb. 27,1871
Little Rock	Feb. 17,1818	Sept. 1,1821
California:		
El Centro	June 15,1916	Sept. 1,1916
Eureka	Mar. 29,1858	July 24,1858
Independence	Apr. 22,1886	Mar. 22,1887
Los Angeles	June 12,1869	Sept. 22,1869
Sacramento[1]	July 26,1866	Nov. 12,1867
San Francisco	Mar. 4,1911	May 1,1911
Susanville	Feb. 10,1871	Mar. 2,1871
Visalia	Mar. 29,1858	July 10,1858
Colorado:		
Del Norte	June 20,1874	Mar. 22,1875
Denver	June 4,1864	Aug. 15,1864
Durango	Apr. 20,1882	Oct. 2,1882
Glenwood Springs	July 3,1884	Nov. 10,1884
Hugo	Feb. 6,1890	Sept. 7,1890
Lamar	Aug. 4,1886	Jan. 3,1887
Leadville	Apr. 5,1879	July 1,1879
Montrose	Jan. 4,1888	Sept. 1,1888
Pueblo	May 27,1870	Jan. 16,1871
Sterling	Feb. 6,1890	Aug. 1,1890
Florida:		
Gainesville	June 8,1872	Apr. 30,1873
Idaho:		
Blackfoot	Sept. 3,1886	Nov. 16,1886
Boise	July 26,1866	Jan. 13,1868
Coeur d'Alene	July 14,1884	Dec. 21,1885
Hailey	Jan. 24,1883	July 16,1883
Lewiston	July 26,1866	Sept. 26,1871
Kansas:		
Dodge City	Dec. 20,1893	Feb. 3,1894
Topeka	July 24,1861	Sept. 10,1861
Louisiana:		
Baton Rouge	Jan. 6,1911	Apr. 1,1911
Michigan:		
Marquette	Mar. 19,1857	July 14,1857
Minnesota:		
Cass Lake	Apr. 1,1903	July 1,1903
Crookston	Apr. 29,1878	May 5,1879
Duluth	Mar. 27,1862	Jan. 15,1863
Mississippi:		
Jackson	June 23,1836	July 25,1836
Missouri:		
Springfield	June 26,1834	Oct. 4,1838
Montana:		
Billings	Feb. 5,1906	July 2,1906
Bozeman	June 20,1874	Oct. 5,1874
Glasgow	Feb. 25,1907	June 1,1907
Great Falls	May 8,1902	Aug. 1,1902
Havre	Mar. 15,1910	July 1,1910
Helena	Mar. 2,1867	Apr. 27,1867
Montana—Contd.		
Kalispell	Mar. 2,1897	July 1,1897
Lewistown	Apr. 1,1890	Nov. 26,1890
Miles City	Apr. 30,1880	Oct. 19,1880
Missoula	Apr. 1,1890	Apr. 20,1891
Nebraska:		
Alliance	Apr. 16,1890	July 1,1890
Broken Bow	....do	July 7,1890
Lincoln	July 7,1868	Sept. 7,1868
North Platte	Apr. 22,1872	Apr. 11,1873
O'Neill	Apr. 7,1888	July 16,1888
Valentine	June 19,1882	July 7,1883
Nevada:		
Carson City	July 2,1862	Mar. 1,1864
Elko	Oct. 3,1913	Jan. 1,1914
New Mexico:		
Clayton	Dec. 18,1888	Aug. 12,1889
Fort Sumner	June 22,1910	Oct. 1,1910
Las Cruces	Mar. 10,1883	May 1,1883
Roswell	Mar. 1,1889	Dec. 9,1889
Santa Fe	May 24,1858	Nov. 24,1858
Tucumcari	Mar. 16,1908	July 1,1908
North Dakota:		
Bismarck	Apr. 24,1874	Oct. 12,1874
Dickinson	Mar. 16,1904	July 1,1904
Minot	Sept. 26,1890	Oct. 1,1891
Williston	Apr. 26,1906	Aug. 1,1906
Oklahoma:		
Guthrie	Mar. 3,1889	Apr. 22,1889
Oregon:		
Burns	June 1,1889	Sept. 2,1889
La Grande	July 3,1866	Nov. 15,1867
Lakeview	June 6,1877	Aug. 6,1877
Portland	Aug. 24,1854	Jan. 1,1855
Roseburg	Sept. 15,1859	Jan. 3,1860
The Dalles	Jan. 11,1875	June 1,1875
Vale	Mar. 15,1910	July 1,1910
South Dakota:		
Bellefourche	Feb. 6,1909	July 1,1909
Gregory	July 14,1880	Jan. 3,1882
Lemmon	May 29,1908	Aug. 1,1908
Pierre	Feb. 10,1890	May 12,1890
Rapid City	Dec. 13,1888	Jan. 15,1889
Timber Lake	Feb. 12,1911	May 1,1911
Utah:		
Salt Lake City	July 16,1868	Nov. 1,1868
Vernal	May 9,1905	July 1,1905
Washington:		
North Yakima	Apr. 11,1885	Apr. 24,1885
Seattle	June 27,1887	Dec. 3,1887
Spokane	June 23,1883	Oct. 1,1883
Vancouver	May 16,1860	July 3,1861
Walla Walla	Mar. 3,1871	July 17,1871
Waterville	May 16,1890	Nov. 6,1890
Wisconsin:		
Wausau	June 19,1872	Aug. 19,1872
Wyoming:		
Buffalo	Mar. 3,1887	May 1,1888
Cheyenne	Feb. 5,1870	Aug. 10,1870
Douglas	Apr. 23,1890	Nov. 1,1890
Evanston	Aug. 9,1876	Aug. 13,1877
Lander	Apr. 23,1890	Nov. 8,1890
Sundance	Apr. 3,1890	Oct. 27,1890

[1] Office originally established January 16, 1857, and transferred to Oakland, California, following the fire on Apr. 16, 1906.

NOTE.—The land offices in Ohio, Indiana, Illinois, and Iowa are abolished, and the vacant tracts of public lands in those States are subject to entry and location at the General Land Office, Washington, D. C.

List of offices of United States surveyors general.

Locations.	Established.	Locations.	Established.
Alaska: Juneau	May 17, 1884	New Mexico: Santa Fe	Mar. 2, 1867
Arizona: Phoenix	Feb. 24, 1863	Oregon: Portland	July 17, 1854
California: San Francisco	Mar. 3, 1851	South Dakota: Huron	Apr. 10, 1890
Colorado: Denver	Feb. 28, 1861	Utah: Salt Lake City	July 16, 1868
Idaho: Boise	June 29, 1866	Washington: Olympia	July 17, 1854
Montana: Helena	July 2, 1864	Wyoming: Cheyenne	Feb. 5, 1870
Nevada: Reno	July 4, 1866		

Field division headquarters of special agents of General Land Office.

Field division:

Portland	Portland, Oreg.
San Francisco	San Francisco, Cal.
Alaskan	Juneau, Alaska.
Helena	Helena, Mont.
Denver	Denver, Colo.
Cheyenne	Cheyenne, Wyo.
Southern	Jackson, Miss.
Salt Lake City	Salt Lake City, Utah.
Santa Fe	Santa Fe, N. Mex.

Present organization General Land Office.

A. Administrative duties. Appointments; bonds of officials, except mineral surveyors; correspondence concerning local officers, surveyors general, etc.; establishment of new land districts, changes in location of district land offices, changes in district boundary lines, discontinuance of local land offices; publication of notices of intention to offer final proof; opening and sale of Indian reservations; printing and binding; bird reservations; national monuments; leaves of absences; requisitions for supplies; record of attorneys and agents admitted before department and its bureaus, also before district land offices.

B. Record of patents; use of rectigraph and photostat machines in making photographic copies of papers.

C. Homesteads, all original, except reclamation; final homesteads; commuted homesteads; homestead declaratory statements; timber and stone entries; public sales, isolated tracts; private sale, lands in Missouri.

D. Mails and files.

E. Surveys.

F. Reclamation work, excepting Minnesota drainage; rights of way; power sites; withdrawals and restorations under the act of June 25, 1910; desert land entries; easements and permits.

G. Land grants to States and corporations.

H. Contests.

K. Indian allotments and Indian homesteads; opening and sale of Indian reservations; preemptions; townsites; military bounty land warrants; abandoned military reservations; agricultural college and other similar scrip; lieu selections; Indian exchange selections; graduation and credit system entries; private land claims; Minnesota drainage entries; Chippewa logging, Minnesota.

L. Drafting; compilation, engraving, and supervision of publication of United States map for Congress, compilation and revision of State maps, diagrams and miscellaneous maps; custodian of original plats, field notes, and photolithographic copies of township plats.

M. Accounts; repayments; statistics.

N. Mineral entries; contests involving character of land; protests in mineral cases; coal, oil, phosphate, and potash withdrawals and restorations; Northern Pacific classification; mineral segregation plats; bonds of mineral surveyors.

O. Posting, tract books.

FS. Soldiers' additional homesteads; fraudulent entries; timber trespass; unlawful inclosure public domain; suits to set aside patents; disbarment of attorneys and agents; forest reserve eliminations, restorations, etc.

Average number of employees of the General Land Office, June 30, 1917.

In General Land Office, Washington, D. C.	533
In 13 offices of surveyors general	149
In 98 district land offices	442
In the field service	168
In the surveying service	194
In logging service	14
Town-site trustees	1
Custodians	1
Total	1,502

Final homestead entries from passage of homestead act to June 30, 1917.

Fiscal year ended June 30—	Number.	Acres.	Fiscal year ended June 30—	Number.	Acres.
1868	2,772	355,086.04	1894	20,544	2,929,947.41
1869	3,965	504,301.97	1895	20,922	2,980,809.30
1870	4,041	519,727.84	1896	20,099	2,790,242.55
1871	5,087	629,162.25	1897	20,115	2,778,404.20
1872	5,917	707,409.83	1898	22,281	3,095,017.75
1873	10,311	1,224,890.93	1899	22,812	3,134,140.44
1874	14,129	1,585,781.56	1900	25,286	3,477,842.71
1875	18,293	2,068,537.74	1901	37,568	5,241,120.76
1876	22,530	2,590,552.81	1902	31,627	4,342,747.70
1877	19,900	2,407,828.19	1903	26,373	3,576,964.14
1878	22,460	2,662,980.82	1904	23,932	3,232,716.75
1879	17,391	2,070,842.39	1905	24,621	3,419,387.15
1880	15,441	1,938,234.89	1906	25,546	3,526,748.58
1881	15,077	1,928,204.76	1907	26,485	3,740,567.71
1882	17,174	2,219,453.80	1908	29,636	4,242,710.59
1883	18,998	2,504,414.51	1909	25,510	3,699,466.79
1884	21,843	2,945,574.72	1910	23,253	3,795,862.89
1885	22,066	3,032,679.11	1911	25,908	4,620,197.12
1886	19,356	2,663,531.83	1912	24,326	4,306,068.52
1887	19,866	2,749,037.48	1913	53,252	10,009,285.16
1888	22,413	3,175,400.64	1914	48,724	9,291,121.46
1889	25,549	3,681,708.80	1915	37,343	7,180,981.62
1890	28,080	4,060,592.77	1916	37,958	7,278,280.60
1891	27,686	3,954,587.77	1917	43,727	8,497,389.68
1892	22,822	3,259,897.07			
1893	24,204	3,477,231.63	Total	1,145,219	170,105,673.73

Timber and stone entries from passage of act June 3, 1878, to June 30, 1917.

State.	Entries.	Acres.	Amount.
Alabama	361	27,284.35	$78,276.12
Arizona	12	1,561.45	4,076.36
Arknasas	2,227	298,416.71	610,048.92
California	20,401	2,835,700.75	7,212,692.40
Colorado	2,987	367,497.13	943,357.18
Florida	913	103,357.21	287,498.55
Idaho	7,368	988,120.27	2,559,093.56
Iowa	3	119.36	298.40
Louisiana	1,570	139,389.62	346,903.33
Michigan	1,699	139,459.74	356,840.79
Minnesota	12,411	1,392,565.80	3,506,935.32
Mississippi	116	7,862.73	22,441.35
Montana	5,027	647,551.25	1,670,173.15
Nebraska	2	97.33	268.00
Nevada	52	6,502.14	16,205.74
North Dakota	81	8,646.31	22,005.78
Oklahoma	1	40.00	100.00
Oregon	26,337	3,744,892.08	9,507,522.86
South Dakota	567	61,865.09	159,059.94
Utah	28	2,920.60	7,011.42
Washington	16,174	2,144,838.95	5,442,328.41
Wisconsin	1,084	78,818.24	198,081.40
Wyoming	3,440	388,495.47	961,225.19
Total	102,861	13,386,002.58	33,912,444.17

Desert-land entries from passage of act, Mar. 3, 1877, to June 30, 1917.

State or Territory.	Entries.		Acres.		Amount.		
	Original.	Final.	Original.	Final.	Original.	Final.	Total.
Arizona	8,666	1,188	2,351,895.72	296,059.72	$590,444.22	$327,679.26	$918,123.48
California	22,523	4,353	4,961,632.77	797,586.80	1,256,561.81	819,909.01	2,076,470.82
Colorado	17,066	3,571	3,164,206.07	631,393.52	891,546.12	625,048.87	1,516,594.99
Dakota Territory	35	1	20,021.00	300.00	5,005.25	300.00	5,305.25
Idaho	17,289	4,340	2,957,078.46	887,371.02	740,678.02	839,781.72	1,580,459.74
Montana	31,678	13,845	5,922,443.22	2,607,777.87	1,487,199.10	2,603,291.64	4,090,490.74
Nevada	2,379	504	526,748.46	102,571.28	122,033.19	102,053.18	224,086.37
New Mexico	11,146	1,522	2,143,496.93	221,709.30	538,013.73	320,179.04	858,192.77
North Dakota	517	114	85,278.51	19,591.75	21,321.09	19,616.49	40,937.58
Oregon	6,370	1,663	1,079,088.64	267,790.64	269,346.87	264,112.15	533,459.02
South Dakota	4,064	605	608,490.58	100,641.12	151,717.37	98,328.85	250,046.22
Utah	7,783	2,412	1,359,439.37	382,952.12	346,674.66	388,420.45	735,095.11
Washington	6,011	617	991,861.17	66,478.68	258,884.85	78,754.85	337,639.70
Wyoming	16,436	6,554	5,411,438.79	1,392,452.72	909,749.62	1,396,486.73	2,306,236.35
Total	151,963	41,289	31,583,119.69	7,774,676.54	7,589,175.90	7,883,962.24	15,473,138.14

Coal-land entries from passage of act, Mar. 3, 1873, to June 30, 1917.

State or Territory.	Entries.	Acres.	Amount.
Alabama	2	239.40	$2,394.00
Alaska	163	37,746.27	377,498.75
Arizona	43	6,693.35	74,997.00
California	38	5,535.06	81,531.30
Colorado	1,041	156,966.62	2,304,015.00
Colorado [1]	443	58,095.65	867,379.55
Dakota Territory	8	583.57	5,835.70
Idaho	13	3,117.41	33,631.80
Montana	434	58,288.43	1,026,814.10
Nevada	8	840.11	11,602.20
New Mexico	219	26,004.67	424,593.05
North Dakota	148	8,783.59	135,280.20
Oregon	66	9,931.03	113,734.30
South Dakota	52	3,303.64	36,164.80
Utah	442	62,765.29	1,668,767.65
Washington	394	63,464.30	1,015,941.00
Wyoming	752	108,149.68	2,334,442.71
Made at General Land Office	1	7.95	159.00
Total	4,267	610,516.02	10,514,782.11

[1] Within the Ute Indian Reservation.

Timber-culture entries from the passage of the act of Mar. 3, 1873, to June 30, 1917.

State or Territory.	Entries.			Area.			Amount.			
	Original.	Final.	Commuted.	Original.	Final.	Commuted.	Fees (original).	Fees (final).	Purchase money.	Total.
				Acres.	*Acres.*	*Acres.*				
Arizona	1,152	52	74	164,806.63	7,149.14	10,223.14	$15,224.00	$208.00	$12,779.26	$28,211.26
Arkansas	41	4	1	4,817.14	480.00	40.00	489.00	16.00	44.00	549.00
California	8,264	481	568	1,163,922.03	63,571.58	78,848.76	110,014.00	1,910.00	98,649.13	210,573.13
Colorado	27,864	3,789	660	4,332,922.19	585,243.30	98,179.52	384,938.00	15,154.00	122,722.36	522,814.36
Dakota Territory	77,446	1,309	.....	12,055,642.98	185,467.24	.....	1,074,862.44	4,984.79	.....	1,079,847.23
Florida	3	.....	.....	480.00	.....	.....	42.00	.....	.....	42.00
Idaho	4,054	341	236	533,957.49	40,436.03	28,244.51	51,447.38	1,369.50	35,305.93	88,122.81
Iowa	1,044	390	40	81,378.95	31,987.87	2,330.89	11,838.83	1,560.00	3,013.62	16,364.05
Kansas	64,345	12,886	961	9,702,653.36	2,005,831.35	142,931.88	883,275.56	51,529.03	178,650.55	1,113,455.14
Louisiana	713	87	42	101,695.31	11,937.97	5,856.85	9,651.55	348.00	7,299.54	17,299.00
Minnesota	15,268	2,924	389	2,099,046.55	373,580.90	40,261.29	207,154.98	11,712.00	61,543.77	280,410.75
Montana	3,595	407	225	486,638.66	56,019.73	29,044.43	46,162.00	1,632.00	36,506.32	84,300.32
Nebraska	59,127	16,870	1,250	8,876,351.20	2,546,696.04	187,371.35	813,382.33	67,776.73	234,332.61	1,115,491.67
Nevada	46	1	.....	6,292.50	160.00	.....	614.00	4.00	.....	618.00
New Mexico	1,612	91	55	230,316.54	12,931.60	7,837.25	21,294.00	363.00	9,796.56	31,453.56
North Dakota	1,699	7,897	781	263,123.95	1,226,605.66	120,524.80	23,446.00	31,576.83	150,661.75	205,684.58
Oregon	7,126	1,502	252	1,051,235.21	224,545.60	35,902.61	95,821.00	6,028.00	44,878.37	146,721.37
South Dakota	2,925	13,764	822	449,583.61	2,124,753.58	121,890.98	40,151.00	55,036.00	152,282.89	247,269.89
Utah	1,476	138	89	179,690.74	15,556.26	10,157.44	17,925.00	552.00	12,696.85	31,173.85
Washington	9,354	2,006	538	1,362,193.51	292,727.52	75,689.54	125,615.00	8,020.00	94,770.83	228,405.83
Wisconsin	1	1	.....	40.00	40.00	.....	9.00	4.00	.....	13.00
Wyoming	3,123	333	125	459,556.42	50,543.08	15,288.29	41,904.00	1,332.00	19,135.91	62,367.91
Total	290,278	65,265	7,108	43,606,344.97	9,856,264.45	1,010,623.81	3,975,261.07	261,115.88	1,275,040.25	5,511,188.80

Land and scrip granted to States and Territories for educational and other purposes.

State or Territory.	Purpose of grant.	Amount granted.	Total by States.
		Acres.	
Alabama	Tuskegee Normal and Industrial Institute	25,000.00	
	Industrial School for Girls	25,000.00	
	Seminary of Learning	46,080.00	
	Internal improvements	500,000.00	
	Agricultural College scrip	240,000.00	
	Common schools, section 16	911,627.00	
	Salt Springs and contiguous lands	23,040.00	
	Seat of government	1,620.00	
			1,772,367.00
Alaska Territory	Common schools, sections 16 and 36, reserved (estimated).	21,009,209.00	
	Agricultural College and School of Mines, certain sections 33, reserved (estimated).	336,000.00	
			21,345,209.00
Arizona	University	46,080.00	
	Common schools, sections 16 and 36	4,046,578.00	
			4,092,658.00
Arizona (act of June 20, 1910).	University	200,000.00	
	Public buildings	100,000.00	
	Penitentiaries	100,000.00	
	Insane asylums	100,000.00	
	Deaf, Dumb, and Blind Asylum	100,000.00	
	Miners' Hospital	50,000.00	
	Normal schools	200,000.00	
	Charitable, penal, etc	100,000.00	
	Agricultural and mechanical colleges	150,000.00	
	School of Mines	150,000.00	
	Military institutes	100,000.00	
	Payment of bonds issued to Maricopa, Pima, Yavapai, and Coconino Counties.	1,000,000.00	
	Common schools, sections 2 and 32	4,046,578.00	
			6,396,578.00
Arkansas	Internal improvements	500,000.00	
	University	46,080.00	
	Public buildings	10,600.00	
	Agricultural College scrip	150,000.00	
	Common schools, section 16	933,778.00	
	Salt Springs and contiguous lands	46,080.00	
			1,686,538.00
California	Internal improvements	500,000.00	
	University	46,080.00	
	Public buildings	6,400.00	
	Agricultural and mechanical colleges	150,000.00	
	Common schools, sections 16 and 36	5,534,293.00	
			6,236,773.00
Colorado	Internal improvements	500,000.00	
	University	46,080.00	
	Public buildings	32,000.00	
	Penitentiaries	32,000.00	
	Agricultural College	90,000.00	
	Common schools, sections 16 and 36	3,685,618.00	
	Salt Springs and contiguous lands	46,080.00	
			4,431,778.00
Connecticut	Agricultural College scrip	180,000.00	
			180,000.00
Delaware	....do	90,000.00	
			90,000.00
Florida	Internal improvements	500,000.00	
	Seminaries of learning	92,160.00	
	Seat of government	5,120.00	
	Agricultural College scrip	90,000.00	
	Common schools, section 16	975,307.00	
			1,662,287.00
Georgia	Agricultural College scrip	270,000.00	
			270,000.00
Idaho	University	46,080.00	
	University, Moscow	50,000.00	
	Agricultural College	90,000.00	
	Penitentiary	50,000.00	
	Public buildings	32,000.00	
	Insane Asylum	50,000.00	
	Educational, charitable, etc	150,000.00	
	Normal schools	100,000.00	
	Scientific schools	100,000.00	
	Common schools, sections 16 and 36	2,963,698.00	
			3,631,778.00
Illinois	Internal improvements	500,000.00	
	Seminary of Learning	46,080.00	
	Seat of government	2,560.00	

Land and scrip granted to States and Territories for educational and other purposes—Con.

State or Territory.	Purpose of grant.	Amount granted.	Total by States.
		Acres.	
Illinois (continued)	Agricultural College scrip	480,000.00	
	Common schools, section 16	996,320.00	
	Salt Springs and contiguous lands	121,029.00	
			2,145,989.00
Indiana	Internal improvements	500,000.00	
	Seminary of Learning	46,080.00	
	Seat of government	2,560.00	
	Agricultural College scrip	390,000.00	
	Common schools, section 16	668,578.00	
	Salt Springs and contiguous lands	23,040.00	
			1,630,258.00
Iowa	Internal improvements	500,000.00	
	University	46,080.00	
	Public buildings	3,200.00	
	Agricultural College	240,000.00	
	Common schools, section 16	988,196.00	
	Salt Springs and contiguous lands	46,080.00	
			1,823,556.00
Kansas	Internal improvements	500,000.00	
	University	46,080.00	
	Pulbic buildings	6,400.00	
	Agricultural College	90,000.00	
	....do	7,682.00	
	Common schools, sections 16 and 36	2,907,520.00	
	Salt Springs and contiguous lands	46,080.00	
			3,603,762.00
Kentucky	Deaf and Dumb Asylum	22,508.65	
	Agricultural College scrip	330,000.00	
			352,508.65
Louisiana	Internal improvements	500,000.00	
	Seminary of Learning	46,080.00	
	Agricultural College scrip	210,000.00	
	Common schools, section 16	807,271.00	
			1,563,351.00
Maine	Agricultural College scrip	210,000.00	
			210,000.00
Maryland	....do	210,000.00	
			210,000.00
Massachusetts	....do	360,000.00	
			360,000.00
Michigan	Internal improvements	500,000.00	
	University	46,080.00	
	Public buildings	3,200.00	
	Agricultural College	240,000.00	
	Common schools, section 16	1,021,867.00	
	Salt Springs and contiguous lands	46,080.00	
			1,857,227.00
Minnesota	Internal improvements	500,000.00	
	University	92,160.00	
	Public buildings	6,400.00	
	Agricultural College	120,000.00	
	Experimental Forestry	20,000.00	
	Public park	8,392.51	
	Common schools, sections 16 and 36	2,874,951.00	
	Salt Springs and contiguous lands	46,080.00	
			3,667,983.51
Mississippi	Internal improvements	500,000.00	
	Seminary of Learning	69,120.00	
	Seat of government	1,253.16	
	Agricultural College scrip	210,000.00	
	Common schools, section 16	824,213.00	
			1,604,586.16
Missouri	Internal improvements	500,000.00	
	Seminary of Learning	46,080.00	
	Seat of government	2,560.00	
	Agricultural College	330,000.00	
	Common schools, section 16	1,221,813.00	
	Salt Springs and contiguous lands	46,080.00	
			2,146,533.00
Montana	University	46,080.00	
	Agricultural College	140,000.00	
	Public buildings	182,000.00	
	Deaf and Dumb Asylum	50,000.00	
	Reform School	50,000.00	
	School of Mines	100,000.00	
	Normal Schools	100,000.00	
	Militia camp	640.00	
	Observatory for University	480.00	
	Biological Station	160.00	
	Common schools, sections 16 and 36	5,198,258.00	
			5,867,618.00

Land and scrip granted to States and Territories for educational and other purposes—Con.

State or Territory.	Purpose of grant.	Amount granted.	Total by States.
		Acres.	
Nebraska	Penitentiary	32,000.00	
	Internal improvements	500,000.00	
	University	46,080.00	
	Public buildings	12,800.00	
	Agricultural College	90,000.00	
	Common schools, sections 16 and 36	2,730,951.00	
	Salt Springs and contiguous lands	46,080.00	
			3,457,911.00
Nevada	Internal improvements	500,000.00	
	University	46,080.00	
	Penitentiary	12,800.00	
	Public buildings	12,800.00	
	Mining and Mechanic Arts	90,000.00	
	Common schools, sections 16 and 36, and lieu lands, act June 16, 1880.	2,061,967.00	
			2,723,647.00
New Hampshire	Agricultural College scrip	150,000.00	
			150,000.00
New Jersey	Agricultural College scrip	210,000.00	
			210,006.00
New Mexico (act June 21, 1898).	University	111,080.00	
	Saline Land (University)	1,622.86	
	Agricultural College	100,000.00	
	Improvement of Rio Grande	100,000.00	
	Penitentiary	50,000.00	
	Public buildings	32,000.00	
	Insane Asylum	50,000.00	
	Deaf and Dumb Asylum	50,000.00	
	Reform School	50,000.00	
	Normal School	100,000.00	
	School of Mines	50,000.00	
	Blind Asylum	50,000.00	
	Reservoirs	500,000.00	
	Miners' Hospital	50,000.00	
	Military Institute	50,000.00	
	Common schools, sections 16 and 36	4,355,662.00	
			5,700,364.86
New Mexico (act June 20, 1910).	University	200,000.00	
	Public buildings	100,000.00	
	Insane asylums	100,000.00	
	Penitentiaries	100,000.00	
	Deaf, Dumb, and Blind Asylum	100,000.00	
	Miners' hospitals	50,000.00	
	Normal schools	200,000.00	
	Charitable, penal, and reformatory	100,000.00	
	Agricultural and mechanical colleges	150,000.00	
	School of Mines	150,000.00	
	Military institutes	100,000.00	
	Payment of bonds issued by Grant and Santa Fe Counties.	1,000,000.00	
	Common schools, sections 2 and 32	4,355,662.00	
			6,705,662.00
New York	Agricultural College scrip	990,000.00	
			990,000.00
North Carolina	Agricultural College scrip	270,000.00	
			270,000.00
North Dakota	University	86,080.00	
	Agricultural College	130,000.00	
	Public buildings	82,000.00	
	Educational, charitable, etc	170,000.00	
	Deaf and Dumb Asylum	40,000.00	
	Reform School	40,000.00	
	School of Mines	40,000.00	
	Normal School	80,000.00	
	Common schools, sections 16 and 36	2,495,396.00	
			3,163,476.00
Ohio	Internal improvements	500,000.00	
	Seminaries of learning	69,120.00	
	Agricultural College scrip	630,000.00	
	Common schools, section 16	724,266.00	
	Salt springs and contiguous lands	24,216.00	
			1,947,300.00
Oklahoma	Normal schools	300,000.00	
	Oklahoma University	250,000.00	
	University Preparatory School	150,000.00	
	Agricultural and Mechanical College	250,000.00	
	Colored Agricultural and Normal University	100,000.00	
	Common schools, sections 16 and 36	1,375,000.00	
	Certain sections 13 and 33	669,000.00	
			3,094,000.00

Land and scrip granted to States and Territories for educational and other purposes—Con.

State or Territory.	Purpose of grant.	Amount granted.	Total by States.
		Acres.	
Oregon	Internal improvements	500,000.00	
	University	46,080.00	
	Public buildings	6,400.00	
	Agricultural College	90,000.00	
	Common schools, sections 16 and 36	3,399,360.00	
	Salt Springs and contiguous lands	46,080.00	
			4,087,920.00
Pennsylvania	Agricultural College scrip	780,000.00	780,000.00
Rhode Island	Agricultural College scrip	120,000.00	120,000.00
South Carolina	Agricultural College scrip	180,000.00	180,000.00
South Dakota	University	86,080.00	
	Agricultural College	160,000.00	
	Public buildings	82,000.00	
	Educational and charitable	170,000.00	
	Deaf and Dumb Asylum	40,000.00	
	Reform School	40,000.00	
	School of Mines	40,000.00	
	Normal schools	80,000.00	
	Missionary work	160.00	
	Military camp ground	640.00	
	Insane Asylum	640.00	
	Common schools, section 16 and 36	2,733,084.00	
			3,432,604.00
Tennessee	Agricultural College scrip	300,000.00	300,000.00
Texas	Agricultural College scrip	180,000.00	180,000.00
Utah	University	156,080.00	
	Agricultural College	200,000.00	
	Public buildings	64,000.00	
	Insane Asylum	100,000.00	
	Deaf and Dumb Asylum	100,000.00	
	Reform School	100,000.00	
	School of Mines	100,000.00	
	Normal schools	100,000.00	
	Blind Asylum	100,000.00	
	Reservoirs	500,000.00	
	Miners' Hospital	50,000.00	
	Common schools, sections 2, 16, 32, and 36	5,844,196.00	
			7,414,276.00
Vermont	Agricultural College scrip	150,000.00	150,000.00
Virginia	Agricultural College scrip	300,000.00	300,000.00
Washington	University	46,080.00	
	Agricultural College	90,000.00	
	Public buildings	132,000.00	
	Educational and charitable	200,000.00	
	Normal schools	100,000.00	
	Scientific schools	100,000.00	
	Common schools, sections 16 and 36	2,376,391.00	
			3,044,471.00
West Virginia	Agricultural College scrip	150,000.00	150,000.00
Wisconsin	Internal improvements	500,000.00	
	University	92,160.00	
	Public buildings	6,400.00	
	Agricultural College	240,000.00	
	Forestry	20,000.00	
	Common schools, section 16	982,329.00	
			1,840,889.00
Wyoming	University	46,080.00	
	Agricultural College	90,000.00	
	Public buildings	107,000.00	
	Penitentiary	30,000.00	
	Insane Asylum	30,000.00	
	Educational, penal, etc	290,000.00	
	Deaf and Dumb Asylum	30,000.00	
	Miners' Hospital	30,000.00	
	Fish hatcheries	5,480.00	
	Poor Farm	10,000.00	
	Common schools, sections 16 and 36	3,470,009.00	
			4,138,569.00
Grand total			133,270,428.18

NOTE.—In addition to the above, various States have received in the aggregate 64,617,099 acres under the swamp land grants.

Lands patented or certified under concessions by act of Congress to States and corporations for railroad and military wagon-road purposes from the year 1850 to June 30, 1917.

STATE GRANTS.

	Acres.
Illinois:	
Illinois Central	2,595,133.00
Mississippi:	
Mobile & Ohio River	[1] 737,130.29
Vicksburg & Meridian	199,101.51
Gulf & Ship Island	139,113.22
	1,075,345.02
Alabama:	
Mobile & Ohio	[1] 419,528.44
Alabama & Florida	399,022.84
Selma, Rome & Dalton	458,555.82
Coosa & Tennessee	67,784.96
Mobile & Girard	[2] 302,181.16
Alabama & Chattanooga	654,009.12
South & North Alabama	445,478.47
	2,746,560.81
Florida:	
Florida Central & Peninsular	741,668.27
Florida & Alabama	166,691.08
Pensacola & Georgia	1,279,236.70
Florida, Atlantic & Gulf Central	29,384.18
	2,216,980.23
Louisiana:	
Vicksburg, Shreveport & Pacific	372,092.34
New Orleans, Opelousas & Great Western	([3])
Arkansas:	
St. Louis, Iron Mountain & Southern	1,325,355.46
Little Rock & Fort Smith	1,052,082.51
Memphis & Little Rock	184,657.33
	2,562,095.30
Missouri:	
Southwest branch of the Pacific road	1,161,284.51
Hannibal & St. Joseph	611,323.35
St. Louis, Iron Mountain & Southern	65,360.31
	1,837,968.17
Iowa:	
Burlington & Missouri River	389,990.11
Chicago, Rock Island & Pacific	[4] 483,214.36
Cedar Rapids & Missouri River	161,532.81 [4] 922,824.85 244,022.96
Dubuque & Sioux City	[4] 556,406.74

[1] In the adjustment of this grant the road was treated as an entirety and without reference to the State line; hence Alabama has had approved to her more and Mississippi less than they would appear to be entitled to in proportion to the length of the road in the respective States.

[2] This grant was adjusted Apr. 24, 1893, and 302,181.16 acres were allotted to the company. The balance of the previously certified lands were ordered restored to entry under the forfeiture act of Sept. 29, 1890.

[3] Certified lands footing 719,189.79 acres were reconveyed to the United States by the governor of Louisiana Feb. 24, 1888, the grant having been forfeited by the act of July 14, 1870 (16 Stat., 277).

[4] Includes 35,685.49 acres of the Chicago, Rock Island & Pacific R. R.; 109,756.85 acres of the Cedar Rapids & Missouri River R. R.; and 77,535.22 acres of the Dubuque & Sioux City R. R., situated in the old Des Moines River grant of Aug. 8, 1846, which should be deducted from the foregoing amount. (Wolcott *v.* Des Moines Co., 5 Wall., 631.)

	Acres.
Iowa—Continued.	
Iowa Falls & Sioux City	683,057.34
Des Moines Valley (river-improvement grant)	840,171.36
Chicago, Milwaukee & St. Paul	326,216.10
McGregor & Missouri River Sioux City & St. Paul	322,412.81
	4,929,849.44
Michigan:	
Port Huron & Lake Michigan	37,467.44
Jackson, Lansing & Saginaw	743,787.58
Grand Rapids & Indiana	852,521.10
Flint & Pere Marquette	512,932.38
Marquette, Houghton & Ontonagon	[1] 305,929.59
Ontonagon & Brule River	34,227.08
Bay de Noquet & Marquette	128,301.05
Chicago & North Western	518,065.36
	3,133,231.58
Wisconsin:	
Chicago, St. Paul, Minneapolis & Omaha (formerly West Wisconsin)	813,706.71
Wisconsin Railroad Farm Mortgage Land Co.	163,159.65
Chicago, St. Paul, Minneapolis & Omaha (formerly St. Croix & Lake Superior)	816,487.76
Branch to Bayfield	471,721.14
Chicago & North Western	546,446.20
Wisconsin Central	838,227.69
	3,649,749.15
Minnesota:	
St. Paul, Minneapolis & Manitoba (formerly first division St. Paul & Pacific) Western R. R. (succeeded by St. Paul & Northern Pacific R. R. Co.) St. Paul, Minneapolis & Manitoba (formerly St. Vincent extension of the St. Paul & Pacific)	[2] 3,259,249.39
Minnesota Central	179,734.29
Winona & St. Peter	1,680,974.92
St. Paul & Sioux City	1,126,618.55
St. Paul & Duluth	860,973.62
Southern Minnesota, from a point on the Mississippi River to Houston Southern Minnesota extension (now Chicago, Milwaukee & St. Paul)	546,745.44
Hastings & Dakota	377,776.15
	8,032,072.36
Minnesota, North Dakota, Montana, and Washington:	
St Paul, Minneapolis & Manitoba, now Great Northern (main and branch), a special act (Aug. 5, 1892, 27 Stat. L., 390) to provide for indemnity for lands relinquished by the company	[3]

[1] Excess of 131,481.71 acres originally certified under this grant reconveyed by State or entered under act Mar. 3, 1887, by Michigan Land & Iron Co. (Ltd.), grant having been forfeited in part by act March, 1889 (25 Stat., 1008).
[2] Declared to be one grant (see 32 L. D., 21).
[3] See Minnesota for original grants.

Kansas:	Acres.
Leavenworth, Lawrence & Galveston	[1] 249,446.13
Missouri, Kansas & Texas	[2] 976,593.22
Atchison, Topeka & Santa Fe	2,944,788.14
St. Joseph & Denver City	462,933.24
	4,633,760.73
Grand total	37,784,838.13

CORPORATION GRANTS.

Union Pacific	11,934,047.36
Central Pacific	6,193,934.96
Central Pacific (successor by consolidation with Western Pacific)	458,786.66
Central Branch Union Pacific	223,080.50
Union Pacific (Kansas division)	6,175,660.63
Union Pacific (successor to Denver Pacific Ry. Co.)	807,564.76
Burlington & Missouri River in Nebraska	2,374,090.77
Sioux City & Pacific (now Missouri Valley Land Co.)	42,610.95
Northern Pacific	37,800,137.60
Oregon branch of the Central Pacific (California & Oregon)	3,160,079.07
Oregon & California	2,765,677.10
Atlantic & Pacific (now Santa Fe Pacific)	6,371,315.70
Southern Pacific (main line)	3,963,005.84
Southern Pacific (branch line)	1,583,264.81
Oregon Central	128,618.13
New Orleans Pacific	1,001,943.40
Grand total	84,938,818.30

WAGON ROADS.

From Lake Erie to Connecticut Western Reserve	80,773.54
From Lake Michigan to Ohio River	170,580.24
From Fort Wilkins, Copper Harbor, Mich., to Green Bay, Wis.	302,930.96
From Fort Wilkins, Copper Harbor, Mich., to Wisconsin State line	221,013.35
Oregon Central Military Co. (now California & Oregon Land Co.)	859,579.89
Corvallis and Yaquina Bay	83,636.76
Willamette Valley and Cascade Mountain	861,511.86
Dalles Military Road	556,827.04
Coos Bay Military Road	105,240.11
Grand total	3,242,093.75

[1] Includes 186,936.72 acres of the "Osage ceded reservation," which are to be deducted from the above amount under the decision of the Supreme Court in the case of the Leavenworth, Lawrence & Galveston Railroad *v.* The United States (92 U. S., 733).

[2] Includes 270,970.78 acres in the "Osage ceded reservation," which are to be deducted under the decision cited in note 2.

Withdrawals under the act of Mar. 15, 1910 (36 Stat., 237), during the fiscal year ended June 30, 1917.

	Pending July 1, 1916.	Applied for 1916–17.	Rejected before withdrawal, 1916–17.	Now pending.	Remaining withdrawn July 1, 1916.	Withdrawn 1916–17.	Restored, 1916–17.	Remaining withdrawn, July 1, 1917.
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
Arizona		640.00		640.00	32,630.76			32,630.76
Colorado	24,209.34			24,209.34	106,021.56		26,474.51	79,547.05
Idaho	21,164.77				19,107.36	21,164.77	19,107.36	21,164.77
Montana								
Nevada		4,986.66			30,400.47	4,986.66		35,387.13
New Mexico								
Oregon	909.91			909.91	75,497.64			75,497.64
Utah					62,636.58		40,251.36	22,385.22
Wyoming	23,938.84	5,155.99	276.51	6,340.48	1,781.06	22,477.84		24,258.90
Total	70,222.86	10,782.65	276.51	32,099.73	328,075.43	48,629.27	85,833.23	290,871.47

State desert-land segregations under sec. 4 of the act of Aug. 18, 1894 (28 Stat., 372–422), and the acts amendatory thereof, commonly designated as the Carey Act, with the action taken thereon, from the passage of the act to June 30, 1917.

	Applied for.	Segregated.	Rejected or relinquished.	Patented.	Reconveyed.	Time to reclaim extended.
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
Arizona	13,905.16					
Colorado	420,805.33	284,653.97	157,747.98	11,511.36		
Idaho	3,251,270.48	1,306,843.80	1,432,898.72	520,114.12		54,115.77
Montana	609,826.46	228,973.84	426,700.57	30,683.69	10,104.03	62,584.95
Nevada	185,445.85	36,808.59	125,613.98			
New Mexico	10,164.68	7,564.68	2,600.00			
Oregon	791,055.27	357,878.84	331,502.91	62,718.34	6,014.49	98,746.14
Utah	606,704.00	141,814.94	326,627.66	25,814.65		
Washington	155,649.39		155,649.39			
Wyoming	1,697,135.97	1,347,075.90	372,382.65	152,676.69	3,977.23	210,757.79
Total	7,741,962.59	3,711,614.56	3,331,723.86	803,518.85	20,095.75	426,204.65

Report of withdrawals made under the act of June 25, 1910 (36 Stat., 847), as amended by act of Aug. 24, 1912 (37 Stat., 497), and the restorations therefrom, from July 1, 1916, to June 30, 1917.

WITHDRAWALS FOR AND RESTORATIONS FROM POWER SITE RESERVES.

State.	Power site withdrawals.					Power site restorations.					
	No.	Date recommended.	Date of approval.	Area.		No.	Date recommended.	Date of approval.	Area.	Outstanding July 1, 1916.	Outstanding June 30, 1917.
				Acres.					*Acres.*	*Acres.*	*Acres.*
Alabama										120	120
Alaska										69,300	69,300
Arizona	531	May 31, 1916	June 30, 1916	8		217	July 19, 1916	Aug. 2, 1916	200		
	558	Oct. 14, 1916	Oct. 30, 1916	456		218	do	do	1,520		
	590	Feb. 15, 1917	Mar. 21, 1917	6,200		237	Jan. 31, 1917	Feb. 14, 1917	60,920		
	600	Mar. 15, 1917	Apr. 28, 1917	600							
	601	do	Apr. 4, 1917	3,120							
	602	do	do	4,040							
	603	do	do	440							
	604	do	do	3,440							
	605	do	Apr. 28, 1917	7,440							
	606	do	Apr. 4, 1917	1,360							
	610	Mar. 31, 1917	Apr. 11, 1917	69							
					27,173				62,640	335,791	300,324
Arkansas										22,354	22,354
California	538	July 19, 1916	Aug. 11, 1916	1,560		229	Oct. 14, 1916	Oct. 30, 1916	120		
	541	July 31, 1916	Aug. 21, 1916	1,202		226	Oct. 31, 1916	Nov. 21, 1916	100		
	543	Aug. 15, 1916	Sept. 5, 1916	228		239	Feb. 28, 1917	Mar. 27, 1917	39		
	555	Aug. 31, 1916	Sept. 21, 1916	600		245	May 15, 1917	June 29, 1917	148		
	557	Sept. 30, 1916	Oct. 17, 1916	440							
	560	Oct. 14, 1916	Oct. 30, 1916	1,520							
	586	Jan. 31, 1917	Feb. 14, 1917	1,685							
	593	Feb. 28, 1917	Mar. 21, 1917	40							
	594	do	do	18							
	611	Mar. 31, 1917	Apr. 28, 1917	240							
	613	do	Apr. 12, 1917	240							
	614	do	May 4, 1917	430							
	637	May 31, 1917	June 29, 1917	120							
					8,323				407	256,090	264,006
Colorado	539	July 8, 1916	Aug. 9, 1916	2,800		240	Feb. 28, 1917	Mar. 21, 1917	290		
	542	July 31, 1916	Aug. 25, 1916	280							
	612	Mar. 31, 1917	Apr. 17, 1917	44							
					3,124				290	273,670	276,504
Idaho	552	Aug. 31, 1916	Nov. 5, 1916	264		220	July 19, 1916	Aug. 9, 1916	160		
	565	Oct. 31, 1916	Nov. 21, 1916	865		231	Oct. 31, 1916	Nov. 24, 1916	40		

	571	Nov. 15, 1916	Dec. 20, 1916	17		232	Nov. 29, 1916	Dec. 20, 1916	18			
	575	Jan. 15, 1917	Jan. 25, 1917	564		233	Dec. 30, 1916	Jan. 15, 1917	160			
	587	Jan. 31, 1917	Mar. 21, 1917	969		235	Jan. 31, 1917	Feb. 27, 1917	405			
	588	Feb. 15, 1917	Apr. 6, 1917	17		242	Mar. 31, 1917	Apr. 28, 1917	375			
	595	Mar. 15, 1917	Apr. 4, 1917	140		244	May 15, 1917	June 29, 1917	80			
	615	Mar. 31, 1917	Apr. 28, 1917	151								
					2,987					1,238	260,745	262,494
Michigan											1,240	1,240
Minnesota											12,309	12,309
Montana	540	July 31, 1916	Sept. 5, 1916	440		223	July 31, 1916	Aug. 23, 1916	600			
	589	Feb. 15, 1917	Apr. 4, 1917	16		227	Oct. 14, 1916	Oct. 22, 1916	160			
	627	Apr. 14, 1917	Apr. 28, 1917	80		234	Jan. 15, 1917	Jan. 30, 1917	617			
						243	Apr. 14, 1917	Apr. 28, 1917	89			
						247	May 31, 1917	June 29, 1917	6,664			
					536					8,130	171,891	164,297
Nebraska											761	761
Nevada	544	Aug. 15, 1916	Sept. 5, 1916	1,128								
	628	Apr. 30, 1917	May 28, 1917	80								
					1,208						26,153	27,361
New Mexico	546	Aug. 31, 1916	Oct. 2, 1916	3,721		225	Aug. 31, 1916	Sept. 19, 1916	680			
	547	.....do.....	Sept. 30, 1916	15,246								
	548	.....do.....	.....do.....	23,791								
	549	.....do.....	Sept. 15, 1916	4,661								
	551	.....do.....	Sept. 21, 1916	920								
	574	Jan. 15, 1917	Feb. 1, 1917	1,360								
	596	Mar. 15, 1917	Apr. 6, 1917	6								
					49,705					680	13,577	62,602
Oregon	537	July 6, 1916	Aug. 2, 1916	200		219	July 6, 1916	Aug. 2, 1916	40			
	553	Aug. 31, 1916	Oct. 17, 1916	720		222	July 31, 1916	Aug. 21, 1916	40			
	561	Oct. 14, 1916	Oct. 30, 1916	6,246		224	Aug. 15, 1916	Sept. 5, 1916	684			
	566	Oct. 31, 1916	Nov. 24, 1916	11,291								
	578	Jan. 15, 1917	Feb. 6, 1917	120								
	579	.....do.....	Feb. 1, 1917	314								
	581	.....do.....	Jan. 19, 1917	1,962								
	582	.....do.....	.....do.....	3,701								
	583	.....do.....	.....do.....	2,640								
	584	.....do.....	.....do.....	760								
	585	Jan. 31, 1917	Feb. 14, 1917	80								
	591	Feb. 15, 1917	Mar. 21, 1917	800					a			
	617	Apr. 14, 1917	Apr. 28, 1917	340								
	618	.....do.....	.....do.....	2,879								
	619	.....do.....	Apr. 30, 1917	6,360								
	620	.....do.....	Apr. 28, 1917	1,760								
	621	.....do.....	.....do.....	10,181								
	622	.....do.....	.....do.....	80								
	623	.....do.....	May 7, 1917	1,463								
	624	.....do.....	Apr. 28, 1917	480								
	625	.....do.....	Apr. 30, 1917	680								
	630	May 15, 1917	June 29, 1917	119								
	635	.....do.....	.....do.....	230								
					56,406					764	261,676	317,318

Report of withdrawals made under the act of June 25, 1910 (36 Stat., 847), as amended by act of Aug. 24, 1912 (37 Stat., 497), and the restorations therefrom, from July 1, 1916, to June 30, 1917—Continued.

State.	Power site withdrawals.					Power site restorations.						
	No.	Date recommended.	Date of approval.	Area.		No.	Date recommended.	Date of approval.	Area.		Outstanding July 1, 1916.	Outstanding June 30, 1917.
				Acres.					*Acres.*		*Acres.*	*Acres.*
Utah	567	Nov. 15, 1916	Dec. 20, 1916	40		230	Oct. 31, 1916	Nov. 21, 1916	4,064			
	569	do	do	40		236	Jan. 31, 1917	Feb. 21, 1917	489			
	570	do	do	440								
	576	Jan. 15, 1917	Jan. 25, 1917	240								
					760					4,553	451,217	447,424
Washington	536	July 7, 1916	July 8, 1916	2,305		238	Feb. 15, 1917	Mar. 21, 1917	160			
	556	Sept. 30, 1916	Oct. 24, 1916			241	Mar. 31, 1917	Apr. 28, 1917	80			
	564	Oct. 14, 1916	Jan. 3, 1917	2,249								
	568	Nov. 15, 1916	Jan. 24, 1917	200								
	572	Dec. 15, 1916	Mar. 2, 1917	620								
	573	Dec. 30, 1916	Jan. 11, 1917	32								
	592	Feb. 15, 1917	Mar. 21, 1917	21								
					5,427					240	108,593	113,780
Wyoming	563	Nov. 15, 1916	Dec. 20, 1916	569		215	July 31, 1916	Aug. 23, 1916	966			
	616	Mar. 31, 1917	May 25, 1917	135								
					704					966	87,165	86,903
Total					156,353					79,908	2,352,652	2,429,097

State.	Public water withdrawals.					Public water restorations.					
	No.	Date recommended.	Date of approval.	Area.		No.	Date recommended.	Date of approval.	Area.	Outstanding July 1, 1916.	Outstanding June 30, 1917.
				Acres.							
Arizona	37	July 19, 1916	Aug. 25, 1916	956						*Acres.*	*Acres.*
	42	Oct. 15, 1916	Jan. 3, 1917	1,560							
					2,516					9,922	12,438
California	41	Oct. 16, 1916	.....do.....		2,788	7	Oct. 31, 1916	Nov. 21, 1916	160	49,846	52,474
Colorado										480	480
Idaho	47	Jan. 31, 1917	Apr. 7, 1917		1,040					6,170	7,210
Montana	35	June 30, 1916	July 17, 1916	80							
	38	Sept. 30, 1916	Oct. 17, 1916	240							
	49	Jan. 31, 1917	Apr. 28, 1917	1,944							
					2,264					1,040	3,304
Nevada										4,336	4,336
New Mexico	39	Sept. 30, 1916	Oct. 17, 1916	160							
	50	Apr. 14, 1917	Apr. 28, 1917	686							
					846					1,440	2,286
Oregon	48	Jan. 31, 1917	Feb. 27, 1917		160	9	Jan. 31, 1917	Apr. 6, 1917	178	2,500	2,482
Utah						8	Jan. 15, 1917	Jan. 25, 1917	160	33,987	33,827
Washington	40	Sept. 30, 1916	Oct. 17, 1916		40						40
Wyoming	36	July 8, 1916	Aug. 2, 1916	1,600		10	May 31, 1917	June 29, 1917	3,000	83,551	82,831
	43	Oct. 16, 1916	Jan. 3, 1917	360							
	44	Nov. 15, 1916	Dec. 20, 1916	240							
	45	Jan. 31, 1917	Apr. 13, 1917	80							
					3,280						
Total					11,934				3,498	193,272	201,708
Grand total					168,287				83,406	2,545,924	2,630,805

Public and Indian lands entered each year ended June 30, from 1911 to 1917, inclusive.

State or Territory.	1911	1912	1913	1914	1915	1916	1917
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Alabama	49,518.88	90,615.04	56,245.68	39,485.65	25,154.63	21,229.16	14,255.54
Alaska	15,477.69	5,244.95	103.67	3,144.15	22,036.02	33,940.98	32,741.40
Arizona	486,066.86	669,292.97	770,449.59	765,962.11	291,557.70	1,881,044.63	1,431,627.45
Arkansas	201,006.00	247,318.58	178,065.19	174,665.29	165,080.01	184,359.50	160,645.85
California	1,064,644.89	872,301.68	937,230.43	878,874.21	1,001,663.53	640,361.85	754,964.55
Colorado	2,272,068.99	1,354,326.05	1,458,107.84	1,433,305.88	2,666,068.22	3,076,601.22	2,092,705.73
Florida	144,809.48	183,061.64	96,277.34	70,302.88	66,988.42	58,455.29	43,624.78
Idaho	1,191,012.91	860,840.25	1,030,312.55	947,553.93	1,144,276.80	1,066,352.41	769,455.55
Illinois							
Indiana							
Iowa							
Kansas	122,810.19	71,915.69	68,775.14	41,651.71	68,190.59	212,288.36	114,772.39
Louisiana	24,432.63	16,491.13	16,309.44	19,781.87	15,618.56	18,358.07	16,545.15
Michigan	17,189.17	17,222.57	13,636.92	16,900.73	14,981.80	10,751.32	9,570.89
Minnesota	239,830.59	397,158.46	191,762.18	323,305.20	298,534.64	268,140.25	109,455.90
Mississippi	34,440.75	27,708.14	20,599.64	19,918.35	18,007.56	18,381.11	15,205.05
Missouri	19,292.74	21,958.55	4,470.06	2,813.91	2,572.69	1,744.36	1,324.89
Montana	4,659,232.48	3,687,420.90	4,717,117.51	5,386,954.28	4,187,364.36	4,038,658.80	4,206,095.60
Nebraska	1,505,584.66	1,394,388.57	997,812.22	1,037,342.10	372,323.52	219,504.29	109,825.04
Nevada	312,510.88	261,188.07	173,799.66	194,308.33	290,138.53	212,554.83	92,871.29
New Mexico	1,377,563.07	1,050,399.79	2,324,250.89	1,870,138.66	3,266,995.81	2,831,204.86	1,850,779.88
North Dakota	513,357.48	384,218.11	418,685.76	604,264.16	365,719.63	337,089.13	321,494.13
Oklahoma	146,600.50	97,563.31	65,959.39	51,568.38	50,953.86	54,043.83	57,934.20
Oregon	742,049.87	745,869.45	561,810.14	839,990.89	738,401.77	561,739.40	428,255.14
South Dakota	1,711,629.43	696,546.70	468,658.33	378,469.32	321,763.13	1,045,854.96	1,213,326.90
Utah	693,770.08	549,883.11	262,863.44	189,781.34	373,507.39	335,101.87	461,178.17
Washington	481,459.19	382,565.57	357,323.51	294,930.73	324,384.09	188,488.03	433,158.16
Wisconsin	17,970.36	16,099.44	11,300.18	10,430.11	8,116.32	5,615.18	4,026.53
Wyoming	1,167,042.50	503,090.10	665,255.75	927,007.95	760,815.11	1,721,289.23	1,455,954.22
Gen. Land Office			40.00				
Total	19,211,372.27	14,574,688.82	15,867,222.45	16,522,852.12	16,861,214.69	19,043,152.92	16,201,794.38

Public lands surveyed and remaining unsurveyed.

	Land area.	Surveyed during fiscal year ended June 30, 1917.	Surveyed to June 30, 1917.	Unsurveyed to June 30, 1917.	Resurveyed during fiscal year ended June 30, 1917.
	Acres.	Acres.	Acres.	Acres.	Acres.
Alabama	32,818,560	7	32,818,560		
Alaska	378,165,760	344,158	863,254	377,302,506	
Arizona	72,838,400	1,006,855	27,760,642	45,077,758	61,346
Arkansas	33,616,000	694	33,616,000		
California	99,617,280	124,487	80,379,760	19,237,520	61,241
Colorado	66,341,120	54,713	63,408,624	2,932,496	726,857
Florida	35,111,040	2,309	30,932,869	4,178,171	
Idaho	53,346,560	937,620	33,882,777	19,463,783	23,255
Illinois	35,867,520		35,867,520		
Indiana	23,068,800		23,068,800		
Iowa	35,575,040		35,575,040		
Kansas	52,335,360		52,335,360		
Louisiana	29,061,760		29,061,760		
Michigan	36,787,200		36,787,200		
Minnesota	51,749,120	11	49,827,906	1,921,214	
Mississippi	29,671,680	26	29,671,680		
Missouri	43,985,280		43,985,280		
Montana	93,568,640	2,643,518	72,585,046	20,983,594	69,120
Nebraska	49,157,120		49,157,120		1,220,029
Nevada	70,285,440	509,096	42,984,466	27,300,974	2,479
New Mexico	78,401,920	704,393	58,281,159	20,120,761	7,172
North Dakota	44,917,120	12,032	42,987,379	1,929,741	
Ohio	26,073,600		26,073,600		
Oklahoma	44,424,960		44,424,960		
Oregon	61,188,480	185,042	52,574,673	8,613,807	
South Dakota	49,195,520	8,766	48,740,076	455,444	8,160
Utah	52,597,760	544,002	31,715,584	20,882,176	23,101
Washington	42,775,040	166,118	34,378,979	8,396,061	10,914
Wisconsin	35,363,840		35,363,840		
Wyoming	62,460,160	43,393	58,707,772	3,752,388	704,197
Total	1,820,366,080	7,287,240	1,237,817,686	582,548,394	2,917,871

NOTE.—In Alabama and Arkansas the lands surveyed were not regarded as public land when the surrounding lands were originally surveyed.

Estimated area of existing national forests June 30, 1917.

[Approximately 87 per cent is public.]

	Acres.		Acres.
Alaska	21,013,435	New Mexico	9,814,750
Arizona	12,766,890	North Dakota	13,920
Arkansas	1,487,468	Oklahoma	61,640
California	24,584,060	Oregon	15,492,440
Colorado	14,855,966	Porto Rico	65,950
Florida	675,420	South Dakota	1,313,226
Idaho	19,375,106	Utah	7,962,971
Michigan	163,878	Washington	11,624,374
Minnesota	1,581,014	Wyoming	8,619,855
Montana	19,004,583		
Nebraska	217,818	Total area	176,252,160
Nevada	5,557,396		

	Acres.
Area added to national forests during year	644,217
Increase in area by reason of recomputation in Forest Service	105,053
Area excluded from national forests during year	437,461
Area embraced in temporary forest withdrawals June 30, 1917	134,060
Area of existing national forests June 30, 1916	175,940,351
Area of existing national forests June 30, 1917	176,252,160
Net increase in area during fiscal year ended June 30, 1917	311,809

National forests, by States, together with estimated areas thereof, June 30, 1917.

State or Territory.	Forest.	Area in acres.	Total area in State or Territory.
Alaska	Chugach	5,532,435	
	Tongass	15,481,000	21,013,435
Arizona	Apache	1,276,400	
	Chiricahua [1]	358,848	
	Coconino	1,763,397	
	Coronado	998,980	
	Crook	885,000	
	Dixie [1]	17,680	
	Kibab	1,072,900	
	Manzano [1]	57,432	
	Prescott	1,619,955	
	Sitgreaves	893,720	
	Tonto	2,033,760	
	Tusayan	1,788,818	12,766,890
Arkansas	Arkansas	958,290	
	Ozark	529,178	1,487,468
California	Angeles	1,061,703	
	California	1,062,622	
	Cleveland	813,616	
	Crater [1]	57,022	
	Eldorado [1]	835,800	
	Inyo [1]	1,337,780	
	Klamath [1]	1,734,665	
	Lassen	1,321,343	
	Modoc	1,582,859	
	Mono [1]	874,861	
	Monterey	360,494	
	Plumas	1,432,860	
	Santa Barbara	1,928,294	
	Sequoia	2,469,270	
	Shasta	1,586,880	
	Sierra	1,662,560	
	Siskiyou [1]	401,795	
	Stanislaus	1,104,412	
	Tahoe [1]	1,209,077	
	Trinity	1,746,147	24,584,060

[1] Forest in two States.

National forests, by States, together with estimated areas thereof, June 30, 1917—Continued.

State or Territory.	Forest.	Area in acres.	Total area in State or Territory.
Colorado	Arapaho	681,274	
	Battlement	677,340	
	Cochetopa	930,220	
	Colorado	1,149,594	
	Durango	704,000	
	Gunnison	951,310	
	Hayden [1]	72,000	
	Holy Cross	605,700	
	La Sal [1]	27,620	
	Leadville	1,056,520	
	Montezuma	812,100	
	Pike	1,256,112	
	Rio Grande	1,221,140	
	Routt	919,946	
	San Isabel	651,200	
	San Juan	745,000	
	Sopris	656,000	
	Uncompahgre	867,860	
	White River	871,030	
			14,855,966
Florida	Florida	675,420	
			675,420
Idaho	Boise	1,118,114	
	Cache [1]	545,064	
	Caribou [1]	711,630	
	Challis	1,269,990	
	Clearwater	907,846	
	Coeur d'Alene	790,234	
	Idaho	1,209,280	
	Kaniksu [1]	458,977	
	Lemhi	1,100,562	
	Minidoka [1]	531,120	
	Nezperce	1,666,079	
	Palisade [1]	293,315	
	Payette	863,674	
	Pend Oreille	874,738	
	St. Joe	975,668	
	Salmon	1,643,360	
	Sawtooth	1,220,130	
	Selway	1,802,000	
	Targhee [1]	732,425	
	Weiser	660,900	
			19,375,106
Michigan	Michigan	163,878	
			163,878
Minnesota	Minnesota	312,476	
	Superior	1,268,538	
			1,581,014
Montana	Absaroka	987,710	
	Beartooth	681,930	
	Beaverhead	1,365,000	
	Bitterroot	1,155,868	
	Blackfeet	1,067,090	
	Cabinet	1,026,550	
	Custer	512,810	
	Deerlodge	964,000	
	Flathead	2,088,720	
	Gallatin	909,430	
	Helena	920,480	
	Jefferson	1,175,685	
	Kootenai	1,623,340	
	Lewis and Clark	826,360	
	Lolo	1,181,018	
	Madison	1,035,860	
	Missoula	1,368,191	
	Sioux [1]	114,541	
			19,004,583
Nebraska	Nebraska	217,818	
			217,818
Nevada	Dixie [1]	290,350	
	Eldorado	400	
	Humboldt	726,540	
	Inyo [1]	75,330	
	Mono [1]	483,519	
	Nevada	1,260,800	
	Ruby	433,570	
	Santa Rosa	299,960	
	Tahoe [1]	62,127	
	Toiyabe	1,924,800	
			5,557,396

[1] Forest in two States.

National forests, by States, together with estimated areas thereof, June 30, 1917—Continued.

State or Territory.	Forest.	Area in acres.	Total area in State or Territory.
New Mexico	Alamo	866,656	
	Carson	925,301	
	Chiricahua [1]	129,152	
	Datil	2,941,202	
	Gila	1,600,000	
	Lincoln	632,967	
	Manzano [1]	1,242,779	
	Santa Fe	1,476,693	
			9,814,750
North Dakota	Dakota	13,920	
			13,920
Oklahoma	Wichita	61,640	
			61,640
Oregon	Cascade	1,094,485	
	Crater [1]	1,079,325	
	Deschutes	1,509,860	
	Fremont	971,366	
	Klamath [1]	8,893	
	Malheur	1,262,840	
	Minan	479,813	
	Ochoco	819,030	
	Oregon	1,140,920	
	Santiam	719,983	
	Siskiyou [1]	1,255,250	
	Siuslaw	833,441	
	Umatilla	564,985	
	Umpqua	1,221,391	
	Wallowa	1,069,411	
	Weneha [1]	461,954	
	Whitman	999,493	
			15,492,440
Porto Rico	Luquillo	65,950	
			65,950
South Dakota	Black Hills [1]	602,011	
	Harney	627,947	
	Sioux [1]	83,268	
			1,313,226
Utah	Ashley [1]	992,100	
	Cache [1]	319,581	
	Dixie [1]	458,890	
	Fillmore	779,290	
	Fishlake	723,390	
	La Sal [1]	535,670	
	Manti	846,870	
	Minidoka [1]	92,280	
	Powell	704,700	
	Sevier	802,660	
	Uinta	1,043,135	
	Wasatch	664,405	
			7,962,971
Washington	Chelan	724,110	
	Columbia	942,200	
	Colville	816,000	
	Kaniksu [1]	376,763	
	Okanogan	1,541,000	
	Olympic	1,652,000	
	Rainier	1,561,470	
	Snoqualmie	1,042,000	
	Washington	1,490,000	
	Wenaha [1]	321,831	
	Wenatchee	1,157,000	
			11,624,374
Wyoming	Ashley [1]	6,060	
	Bighorn	1,136,200	
	Black Hills [1]	179,121	
	Bridger	717,977	
	Caribou [1]	7,360	
	Hayden [1]	365,620	
	Medicine Bow	511,382	
	Palisade [1]	253,620	
	Shoshone	1,609,000	
	Targhee [1]	85,450	
	Teton	1,971,192	
	Washakie	864,873	
	Wyoming	912,000	
			8,619,855
Total of 152 national forests			176,252,160

[1] Forest in two States.

List of bird reserves.

Name of reservation.	Date.	Location.	Area.
			Acres.
Pelican Island	Mar. 14, 1903	East Florida coast	5.50
Breton Island	Oct. 4, 1904 Nov. 11, 1905	Southeast coast of Louisiana	Unknown.
Stump Lake	Mar. 9, 1905	North Dakota	27.39
Huron Islands	Oct. 10, 1905	Lake Superior, Mich	Unknown.
Siskiwit Islands	do	do	Do.
Passage Key	do	Tampa Bay, Fla	36.37
Indian Key	Feb. 10, 1906	do	90.00
Tern Islands	Aug. 8, 1907	Mouths of Mississippi River, La	Unknown.
Shell Keys	Aug. 17, 1907	South Louisiana coast	Do.
Three Arch Rocks	Oct. 14, 1907	West Oregon coast	Do.
Flattery Rocks	Oct. 23, 1907	West Washington coast	Do.
Quillayute Needles	do	do	Do.
Copalis Rock	do	do	Do.
East Timbalier Island	Dec. 7, 1907	South Louisiana coast	Do.
Mosquito Inlet	Feb. 24, 1908	East Florida coast	Do.
Tortugas Keys	Apr. 6, 1908	Florida Keys, Fla	Do.
Klamath Lake	Aug. 8, 1908	Oregon and California	Do.
Key West	do	Florida Keys, Fla	Do.
Lake Malheur	Aug. 18, 1908	Oregon	Do.
Chase Lake	Aug. 28, 1908	North Dakota	Do.
Pine Island	Sept. 15, 1908	West Florida coast	Do.
Matlatcha Pass	Sept. 26, 1908	do	Do.
Palma Sola	do	do	Do.
Island Bay	Oct. 23, 1908	Florida	Do.
Loch Katrine	Oct. 26, 1908	Wyoming	Do.
Hawaiian Islands	Feb. 3, 1909	Hawaii	Do.
East Park	Feb. 25, 1909	California	Do.
Cold Springs	do	Oregon	Do.
Shoshone	do	Wyoming	Do.
Pathfinder	do	do	Do.
Bellefourche	do	South Dakota	Do.
Strawberry Valley	do	Utah	Do.
Salt River	do	Arizona	Do.
Deer Flat	do	Idaho	Do.
Minidoka	do	do	Do.
Willow Creek	do	Montana	Do.
Carlsbad	do	New Mexico	Do.
Rio Grande	do	do	Do.
Keechelus Lake	do	Washington	Do.
Kachess Lake	do	do	Do.
Clealum Lake	do	do	Do.
Bumping Lake	do	do	Do.
Conconully	do	do	Do.
Bering Sea	Feb. 27, 1909	Alaska	Do.
Pribilof [1]	do	do	Do.
Tuxedni	do	do	Do.
Farallon	do	California	Do.
Culebra	do	Porto Rico	Do.
Yukon Delta	do	Alaska	Do.
St. Lazaria	do	do	Do.
Bogoslof	Mar. 2, 1909	do	Do.
Clear Lake	Apr. 11, 1911	California	Do.
Forrester Island	Jan. 11, 1912	Alaska	Do.
Hazy Islands	do	do	Do.
Niobrara	do	Nebraska	[2] 14.64
Green Bay	Feb. 21, 1912	Wisconsin	1.87
Chamisso Island	Dec. 7, 1912	Alaska	Unknown.
Pishkun	Dec. 17, 1912	Montana	Do.
Desecheo Island	Dec. 19, 1912	Porto Rico	Do.
Gravel Island	Jan. 9, 1913	Wisconsin	Do.
Aleutian Islands	Mar. 3, 1913	Alaska	Do.
Canal Zone [3]	Mar. 19, 1913	Panama	Do.
Walker Lake	Apr. 21, 1913	Arkansas	Do.
Petit Bois Islands	May 6, 1913	Alabama and Mississippi	Do.
Anaho Island	Sept. 4, 1913	Nevada	247.73
Smith Island	June 6, 1914	Washington	Unknown.
Dungeness Spit	Jan. 20, 1915	do	226.02
Ediz Hook	do	do	[2] 83.00
Mille Lacs	May 14, 1915	Minnesota	Unknown.
Big Lake	Aug. 6, 1915	Arkansas	Do.
San Francisco Bay	Aug. 9, 1916	California	141.00
North Platte	Aug. 21, 1916	Nebraska	Unknown.

[1] Transferred to Bureau of Fisheries.
[2] Approximate area.
[3] Under jurisdiction of Isthmian Canal Commission. Canal Zone, strictly speaking, not a bird reservation, but birds are protected by Executive order.

List of bird reserves—Continued.

Name of reservation.	Date.	Location.	Area.
BIRD RESERVES ENLARGED OR REDUCED.			
Pelican Island	Jan. 26, 1909	Florida (enlarged)	Unknown.
Mosquito Inlet	Apr. 2, 1909	.....do	Do.
Cold Springs	Nov. 25, 1911	Oregon (enlarged)	Do.
Clear Lake	Jan. 13, 1912	California (reduced)	Do.
Minidoka	Feb. 21, 1912	Idaho (enlarged)	Do.
Niobrara	Nov. 14, 1912	Nebraska (enlarged)	[1] 15,253.7
Deer Flat	Apr. 21, 1915	Idaho (reduced)	Unknown.
Klamath Lake	May 14, 1915	Oregon and California (reduced)	Do.

[1] Transferred to Bureau of Fisheries.

Total reservations, excluding Canal Zone, 71.

Aggregate cash receipts from the disposal of public and Indian lands from May 20, 1785, to June 30, 1917.

Fiscal years.	Cash sales.	Amount of fees and commissions.	Total receipts from disposal of public lands.	Receipts from sales of Indian lands.	Miscellaneous receipts.	Aggregate receipts from all sources.
May 20, 1785, to June 30, 1880						$208,059,657.14
1881	$3,534,550.98	$860,833.65	$4,395,384.63	$1,006,691.63	$6,727.90	5,408,804.16
1882	6,628,775.92	1,124,531.15	7,753,307.07	634,617.22	6,591.75	8,394,516.04
1883	9,657,032.28	1,423,329.10	11,080,361.38	625,404.27	8,118.05	11,713,883.70
1884	10,304,582.49	1,536,410.58	11,840,993.07	938,137.26	10,274.76	12,789,405.09
1885	6,223,926.74	1,462,188.06	7,686,114.80	933,483.52	8,821.86	8,628,420.18
1886	5,757,891.06	1,654,876.25	7,412,767.31	1,607,729.63	10,587.40	9,031,084.34
1887	9,246,321.33	1,537,600.39	10,783,921.72	1,484,302.30	20,784.85	12,289,008.87
1888	11,203,071.95	1,498,000.05	12,701,072.00	821,113.77	24,951.65	13,547,137.42
1889	8,018,254.50	1,251,971.23	9,270,225.73	389,524.72	26,150.89	9,685,901.34
1890	6,349,174.24	1,121,696.07	7,470,870.31	293,062.30	16,585.00	7,780,517.61
1891	4,160,099.07	944,938.65	5,105,037.72	318,333.42	5,849.00	5,429,220.14
1892	3,322,865.01	1,064,805.26	4,387,670.27	456,681.84	15,757.58	4,860,109.69
1893	3,193,280.64	998,184.65	4,191,465.29	284,752.65	3,516.20	4,479,734.14
1894	1,653,080.71	1,021,205.08	2,674,285.79	91,981.03	1,557.50	2,767,824.32
1895	1,116,090.07	750,710.59	1,866,800.66	149,879.48	16,773.89	2,033,454.03
1896	1,053,905.59	793,557.82	1,847,463.41	214,700.42	44,197.84	2,106,361.67
1897	917,911.19	678,469.55	1,596,380.74	438,716.31	52,834.23	2,087,931.28
1898	1,291,076.10	853,265.50	2,144,341.60	100,317.49	33,336.09	2,277,995.18
1899	1,703,988.32	890,702.17	2,594,690.49	442,913.73	32,533.12	3,070,137.34
1900	2,899,731.83	1,157,081.03	4,056,812.86	239,769.39	83,175.85	4,379,758.10
1901	2,966,542.86	1,340,894.29	4,307,437.15	585,661.27	79,062.37	4,972,160.79
1902	4,139,268.47	1,740,820.18	5,880,088.65	288,666.68	93,171.85	6,261,927.18
1903	8,960,471.18	1,597,147.48	10,557,618.66	308,939.14	158,185.85	11,024,743.65
1904	7,445,902.84	1,349,990.89	8,795,893.73	333,757.62	153,690.63	9,283,341.98
1905	4,849,766.06	1,286,621.93	6,136,387.88	791,807.67	89,615.72	7,017,811.38
1906	4,885,988.82	1,642,488.56	6,528,477.38	967,532.50	89,514.02	7,585,523.90
1907	7,728,114.30	1,819,159.21	9,547,273.51	1,892,805.70	113,098.79	11,553,178.00
1908	9,760,570.19	1,731,883.57	11,492,453.76	997,972.52	225,283.18	12,715,709.46
1909	7,698,337.03	1,536,890.67	9,235,227.70	2,334,885.47	330,136.61	12,216,415.39
1910	6,342,744.75	2,028,892.35	8,371,637.10	2,037,551.68	1,054,735.28	11,463,924.06
1911	5,783,693.39	1,461,514.30	7,195,187.69	2,822,600.71	[1]1,022,119.20	11,089,927.60
1912	5,437,502.07	1,234,216.47	6,671,718.54	2,284,538.37	[1]1,016,791.09	9,973,048.00
1913	2,746,546.52	1,540,994.15	4,287,540.67	2,118,469.34	[1] 549,494.80	6,955,504.81
1914	2,650,761.84	1,654,085.02	4,304,846.86	1,844,802.77	47,677.90	6,148,367.63
1915	2,331,368.44	1,581,805.48	3,913,173.92	1,556,630.97	28,386.01	5,394,948.20
1916	1,769,860.33	1,660,933.33	3,430,793.66	1,972,299.49	41,468.44	5,444,561.59
1917	1,935,954.53	1,641,860.14	3,577,814.67	[2]2,445,582.52	[3]126,233.35	6,149,630.54
Total						486,071,585.94

[1] Includes reclamation water-right charges.
[2] Includes $152.88 originally erroneously reported as Indian sale.
[3] Does not include $152.88 mentioned in footnote [2].

Reclamation water-right charges under act of Aug. 9, 1912 (37 Stat., 265) were collected from Jan. 1, 1913, by the Reclamation Service.

Amounts accrued and paid to States for purposes of education, or of making public roads and improvements on account of grants 2, 3, and 5 per cent of net proceeds of sales of public lands lying within said States.

State.	Total to June 30, 1915.	Fiscal year 1916.	Aggregate to June 30, 1916, inclusive.
Alabama	$1,079,163.94	$137.68	$1,079,301.62
Arizona	14,021.30	3,274.54	17,295.84
Arkansas	326,752.54	221.81	326,974.35
California	1,119,856.59	6,318.39	1,126,174.98
Colorado	482,880.85	5,404.66	488,285.51
Florida	142,543.15	402.60	142,945.75
Idaho	262,692.40	7,066.19	269,758.59
Illinois	1,187,908.89	.....	1,187,908.89
Indiana	1,040,255.26	.....	1,040,255.26
Iowa	633,638.10	.....	633,638.10
Kansas	1,127,454.62	133.70	1,127,588.32
Louisiana	468,831.88	.....	468,831.88
Michigan	587,660.93	209.03	587,869.96
Minnesota	591,613.55	357.68	591,971.23
Mississippi	1,070,200.07	141.31	1,070,341.38
Missouri	1,060,905.19	74.37	1,060,979.56
Montana	477,286.79	17,735.65	495,022.44
Nebraska	565,976.08	1,071.60	567,047.68
Nevada	37,809.54	1,086.64	38,896.18
New Mexico	133,556.21	1,664.25	135,220.46
North Dakota	536,932.18	498.07	537,430.25
Ohio	999,353.01	.....	999,353.01
Oklahoma	62,817.71	584.74	63,402.45
Oregon	736,521.95	4,530.49	741,052.44
South Dakota	335,046.80	4,021.60	339,068.40
Utah	96,660.82	5,201.52	101,862.34
Washington	421,145.75	1,410.44	422,556.19
Wisconsin	586,509.37	73.26	586,582.63
Wyoming	239,257.35	4,479.48	243,736.83
Total	16,425,252.82	66,099.70	16,491,352.52

Amounts covered into the Treasury to the credit of the reclamation fund from the sales of public lands and fees and commissions in the several States, under the act of June 17, 1902 (32 Stat., 388).

State.	Fiscal years.		Total for 16 years ended June 30, 1916.
	1901 to 1915.	1916.	
Arizona	$1,312,362.09	$118,484.80	$1,430,846.89
California	5,906,079.55	191,342.98	6,097,422.53
Colorado	7,356,843.99	384,226.00	7,741,069.99
Idaho	5,438,851.19	232,800.04	5,671,651.23
Kansas	985,713.82	16,110.14	1,001,823.96
Montana	10,492,641.07	763,122.39	11,255,763.46
Nebraska	1,826,801.55	36,648.18	1,863,449.73
Nevada	621,278.34	29,811.13	651,089.47
New Mexico	4,302,563.19	178,446.36	4,481,009.55
North Dakota	12,046,187.78	38,301.78	12,084,489.56
Oklahoma	5,829,750.69	15,748.85	5,845,499.54
Oregon	10,693,654.48	139,247.82	10,832,902.30
South Dakota	7,116,047.82	138,654.44	7,254,702.26
Utah	1,968,808.37	134,260.64	2,103,069.01
Washington	6,892,109.72	49,112.67	6,941,222.39
Wyoming	4,778,268.75	181,739.52	4,960,008.27
Total	87,567,962.40	2,648,057.74	90,216,020.14

State grants, fiscal year ended June 30, 1917.

Kind of selection.	Pending and received.			Disposed of.			Pending June 30, 1917.
	Pending July 1, 1916.	Since received.	Total.	Approved.	Canceled.	Total.	
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acers.*	*Acres.*
Swamp	322,599.06	3,027.31	325,626.37	22,585.48	57,795.10	80,380.58	245,245.79
School indemnity	4,367,363.55	846,284.64	5,213,648.19	691,831.20	26,268.95	718,100.15	4,495,548.04
University	72,948.01	39,832.67	112,780.68	66,989.35	1,478.72	68,468.07	44,312.61
Agricultural and mechanical colleges	70,657.84	64,183.46	134,841.30	22,170.69	.....	22,170.69	112,670.61
Internal improvements	.....	1,191.45	1,191.45	.....	1,191.45	1,191.45	.....
Penitentiaries	8,019.67	27,725.46	35,745.13	13,569.28	.....	13,569.28	22,175.85
Public buildings	28,360.87	18,504.43	46,865.30	10,162.04	.....	10,162.04	36,703.26
Insane asylums	32,931.19	13,554.29	46,485.48	20,506.91	314.49	20,821.40	25,664.08
Educational, charitable, penal, reformatory, etc	31,408.88	12,703.56	44,112.44	17,365.86	761.08	18,126.94	25,985.50
Deaf, dumb, and blind asylums	21,859.65	30,010.19	51,869.84	13,297.46	119.42	13,416.88	38,452.96
Reform schools	80.03	31.09	111.12	31.12	.....	31.12	80.00
School of mines	27,064.09	66,046.03	93,110.12	19,188.49	.....	19,188.49	73,921.63
Normal schools	44,041.49	107,826.48	151,867.97	11,164.58	.....	11,164.58	140,703.39
Reservoirs	314.36	1,441.16	1,755.52	.....	881.94	881.94	873.58
Miners' hospitals	21,626.26	40.00	21,666.26	15,134.39	.....	15,134.39	6,531.87
Military institutes	127,858.08	640.00	128,498.08	51,453.11	153.97	51,607.08	76,891.00
Bonds issued by Santa Fe and Grant Counties	177,261.72	6,246.88	183,508.60	116,431.68	2,457.05	118,888.73	64,619.87
Bonds issued by Maricopa, Pima, etc., counties	460,870.11	407,368.81	868,238.92	160,966.54	1,393.03	162,359.57	705,879.35
Salt springs and contiguous lands	539.41	.....	539.41	523.41	16.00	539.41	.....
Fort Assiniboine, for educational institutions	40.00	.....	40.00	40.00	.....	40.00	.....
Game preserve	.....	3,021.20	3,021.20	3,021.20	.....	3,021.20	.....
Industrial school for girls	.....	78.70	78.70	78.70	.....	78.70	.....
Specific grant total	1,125,881.66	800,445.86	1,926,327.52	542,094.81	8,767.15	550,861.96	1,375,465.56
Grand total	5,815,844.27	1,649,757.81	7,465,602.08	1,256,511.49	92,831.20	1,349,342.69	6,116,259.39

State grants—Recapitulation.

State.	Swamp confirmed.	School indemnity confirmed.	Other grants confirmed.
	Acres.	*Acres.*	*Acres.*
Alabama	.....	298.69	78.70
Arizona	.....	.....	370,453.70
Arkansas	52.28	.....	.....
California	19,334.07	55,158.70	.....
Colorado	.....	.....	720.00
Florida	108.62	.....	.....
Idaho	.....	27,127.78	.....
Indiana	.....	40.00	.....
Kansas	.....	.....	3,021.20
Louisiana	1,146.54	839.30	.....
Minnesota	.....	.....	523.41
Mississippi	80.00	644.05	40.31
Missouri	640.00	.....	.....
Montana	.....	18,092.12	40.00
New Mexico	.....	554,220.74	160,815.10
North Dakota	.....	9,197.48	31.12
Oklahoma	.....	2,916.46	160.00
Oregon	1,223.97	.....	.....
South Dakota	.....	12,866.32	.....
Utah	.....	10,429.56	.....
Wyoming	.....	.....	6,211.27
Total	22,585.48	691,831.20	542,094.81

Withdrawals under the act of Mar. 15, 1910 (36 Stat., 237), from the passage of the act to June 30, 1917.

State.	Applied for.	Rejected before withdrawal.	Withdrawn.	Restored.	Remaining withdrawn.
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*
Arizona	33,270.76		32,630.76		32,630.76
Colorado	1,044,846.19	344,318.56	676,318.29	596,771.24	79,547.05
Idaho	608,336.84	262,091.03	346,245.81	325,081.04	21,164.77
Montana	118,064.07	77,056.57	41,007.50	41,007.50	
Nevada	1,160,074.59	481,023.22	679,051.37	643,664.24	35,387.13
New Mexico	383,951.62	368,090.02	15,861.60	15,861.60	
Oregon	446,470.13	208,607.30	236,952.92	161,455.28	75,497.64
Utah	697,917.28	334,607.97	363,309.31	340,924.09	22,385.22
Wyoming	364,206.65	210,183.53	147,682.64	123,423.74	24,258.90
Total	4,857,138.13	2,285,978.20	2,539,060.20	2,248,188.73	290,871.47

State desert-land segregations under sec. 4 of the act of Aug. 18, 1894 (28 Stat., 372–422), and the acts amendatory thereof, commonly designated as the Carey Act, with the action taken thereon during the fiscal year ended June 30, 1917.

State.	Applied for.	Segregated.	Rejected or relinquished.	Patented.	Reconveyed.	Time to reclaim extended.
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
Arizona						
Colorado			3,795.63	11,511.36		
Idaho			12,101.09	4,028.60		
Montana			[1]			
Nevada	5,440.00					
New Mexico						
Oregon			40.00			
Utah			8,749.29	25,814.65		
Wyoming	676.32	3,247.28	4,435.37	708.94		
Total	6,116.32	3,247.28	29,121.38	42,063.55		

[1] The segregationof 10,104.03 acres previously patented and reconveyed but remaining segregated, has been canceled.

Lands certified or patented on account of railroad and wagon road grants during the fiscal year ended June 30, 1917.

Grant.	State.	Area.
State grants:		*Acres.*
Des Moines Valley R. R	Iowa	80.00
Total		80.00
Corporations:		
Atlantic & Pacific R. R. (now Santa Fe Pacific R. R.)	Arizona	516,590.68
Do	New Mexico	36,850.75
California & Oregon R. R	California	1,228.22
Central Pacific R. R	do	2,052.18
Do	Idaho	2,502.00
Northern Pacific R. R	Dakota	240.00
Do	Idaho	14,548.54
Do	Minnesota	1.20
Do	Montana	856,902.77
Do	Oregon	10,699.68
Do	Washington	106,020.55
Do	Wyoming	3,729.82
Southern Pacific R. R. (main line)	California	27,929.36
Southern Pacific R. R. (branch line)	do	7,432.23
Total		1,586,727.98
Total certified or patented during year		1,586,727.98
Total canceled during year		224,346.83
Total disposed of during year		1,811,154.81
Total received during year		986,596.05

Alleged fraudulent entries acted on during year.

Kind of entry.	Pending June 30,1916.	Received.	Approved.	Canceled.	Otherwise disposed of.	Total.	Pending June 30, 1917.	Hearings ordered General Land Office.
Homestead:								
Originals	4,721	8,043	.....	470	4,843	5,313	7,451	345
Finals	691	1,555	1,432	6	348	1,786	460	25
Cash	100	259	158	2	168	328	31	4
Desert land:								
Originals	815	1,098	.....	16	1,108	1,124	789	42
Finals	432	188	14	4	344	362	258	36
Timber culture:								
Original	5	.....	.....	1	.....	1	4	.....
Finals	2	.....	.....	.....	.....	.....	2	.....
Timber and stone:								
Originals	440	288	.....	34	154	188	540	7
Finals	39	56	39	4	42	85	10	2
Isolated tract:								
Originals	116	72	.....	5	69	74	114	.....
Cash	80	36	6	.....	20	26	90	.....
Mineral:								
Applications	443	160	.....	.....	131	131	472	25
Entry	161	96	.....	.....	156	156	101	11
Soldiers' additional entry	448	674	480	106	3	589	533	.....
Selections:								
State	926	612	.....	.....	352	352	1,186	14
Forest	338	61	.....	.....	178	178	221	6
Railroad	362	21	.....	.....	35	35	348	4
Indian allotment	680	65	.....	.....	120	120	625	.....
Squatter claims	48	.....	.....	.....	.....	.....	48	.....
Mineral locations	689	31	.....	.....	648	648	72	12
Total	11,536	13,315	2,129	648	8,719	11,496	13,355	537

Indictments, convictions, acquittals and dismissals, fines imposed and paid, and prison sentences, June 30, 1916, to June 30, 1917.

Offenses.	Indictments.	Convictions.	Prison sentences.	Fines imposed.	Fines paid.	Acquittals and dismissals.
Timber trespass	24	6	4	$35.00	$35.00	7
Perjury	10	2	1	100.00	.....	4
Inclosure	1	.....	.....	.....	.....	.....
Using mails to defraud	12	7	4	900.00	400.00	6
Intimidation	14	.....	.....	.....	.....	13
Forgery	2	.....	.....	.....	.....	.....
Filing false claims	1	1	.....	.....	.....	.....
Impersonating agent	1	.....	.....	.....	.....	1
Filing false affidavit	2	1	1	1,100.75	1,100.75	.....
Conspiracy to secure entry	2	.....	.....	.....	.....	1
Sec. 37, Penal Code	3	2	.....	1,000.00	1,000.00	1
Total	72	19	10	3,135.75	2,535.75	33

Patents issued during fiscal year ended June 30, 1917.

Class.	No.	Area.	Class.	No.	Area.
		Acres.			*Acres.*
Commuted homestead	2,432	329,949.170	Coal	23	2,845.245
Timber and stone	503	51,382.370	Coal deposit	9	[1]
Public sale	2,805	366,512.220	Private-land claim	14	123,898.130
Cash miscellaneous	339	23,946.720	Small holding claim	14	822.463
Desert land	1,752	277,432,330	Railroad	70	1,586,748.070
Desert-land reclamation	8	520.000	Swamp	18	22,585.480
Desert-land segregation	5	41,983.550	Umatilla Indian lands	9	986.780
Town site	6	343.690	Abandoned military reservation	48	7,186.265
Town lot	991	633.376	Choctaw lands	5	1,601.360
Homestead	29,815	7,020,816.125	Agricultural College (scrip)	2	240.000
Forest homestead	1,145	137,410.950	Isaac Crow lieu scrip	4	160.000
Indian homestead	5	589.460	Sioux half-breed (scrip)	2	120.000
Reclamation homestead	788	55,289.570	Valentine scrip	2	.131
Soldiers' additional homestead	466	22,464.500	State lieu selection	2	78.700
Military bounty land warrant	33	797.300	Mission site	2	13.120
Forest lieu selection	142	56,065.360	Cemetery site	13	749.880
Timber culture	2	160.000	Villa site	6	21.890
Commuted timber culture	1	160.000	Special acts	1,242	190,622.165
Indian	8,312	945,874.735	Supplemental Apr. 14, 1914	2,528	[2]
Mineral	561	42,351.137	Total	54,124	11,313,362.242

[1] Surface area reported elsewhere. [2] Not counted.

Patented area under enlarged homestead acts	acres	4,348,799.83
Patented area under Kinkaid Act	do	672,624.05
Patented area coal reserved	do	1,101,205.07
Patented area act July 17, 1914 (phosphate, etc.)	do	39,246.82
All included in the above report.		
Area of Indian fee patents not included in the above report	do	246,230.167

Consolidated work report for fiscal year, 1917, by months.

	Months.	Pending July 1, 1916.			Received.		Total pending at beginning of year and received during the year.	Disposed of.							Pending June 30, 1917.		
		For office action.	For action elsewhere.	Total.	From outside of office.	By reference from other divisions.		Approved.		Canceled.	Patented.	Otherwise.	Referred to other divisions.	Total.	For office action.	For action elsewhere.	Total.
								Patent.	Other.								
Cases of all kinds	1916.																
	July	38,169	35,711	73,880	24,520	42,487		3,194	7,804	1,028	4,192	5,175	43,533	64,926			
	August				23,760	44,281		3,994	7,851	1,079	3,745	4,442	45,304	66,415			
	September				16,398	37,465		3,832	5,467	681	3,137	3,283	44,537	60,937			
	October				31,246	50,016		3,570	5,960	1,210	5,031	4,564	50,184	70,522			
	November				35,980	61,715		4,545	4,445	1,060	3,981	4,821	72,247	91,099			
	December				27,430	46,222		2,971	4,179	1,002	3,431	3,583	58,637	73,803			
	1917.																
	January				28,233	67,066		5,348	6,349	[illegible]	4,992	4,685	66,162	88,432			
	February				20,469	60,253		5,458	5,780	730	5,394	4,367	62,757	84,486			
	March				13,300	63,961		4,799	8,075	1,006	4,446	4,131	56,221	78,678			
	April				13,470	50,685		3,051	4,893	902	7,526	3,971	46,093	67,036			
	May				14,668	60,465		4,627	3,547	822	4,194	2,525	41,672	57,387			
	June				17,183	53,979	979,102	4,062	4,966	932	4,052	2,397	58,885	75,294	62,028	38,059	100,087
Total		38,169	35,711	73,880	266,597	638,625	979,102	49,451	69,316	11,348	54,124	47,944	646,832	879,015	62,028	38,059	100,087

SELECTIONS—AREA IN ACRES.

Railroads and wagon roads	1916.																
	July	1,077,201.79	2,616,513.85	3,693,715.64	97,466.57	73,611.55		12,019.85		8,901.17			75,970.23	96,891.25			
	August				14,256.91	2,340.52		36,600.12		12,522.72			31,433.10	80,555.94			
	September				22,283.64	30,273.10		14,539.92		2,654.72		668.45	3,128.23	20,991.32			
	October				551,999.74	26,144.42		875,219.85		776.71		363.56	8,225.91	884,586.03			
	November				46,067.65	2,526.35		145,160.47		13,271.77			65,572.27	224,004.51			
	December				11,529.31			255,646.61		5,613.35			3,353.48	264,613.44			
	1917.																
	January				57,072.99	40.00		125,781.47		1,071.36			34,861.66	161,714.49			
	February				111,396.68	75,949.80		2,838.85		163,824.10			141,532.06	308,195.01			
	March				8,613.65	131,865.42		73,481.79		1,755.39			8,613.45	83,850.63			
	April				27,026.77	2,984,296.78							2,934,708.73	2,934,708.73			
	May				26,403.41			669,096.28		11,538.84		650.00	7,181.69	688,466.81			
	June				54,078.07	3,041.28	8,052,300.25			734.69			29,145.85	29,880.54	331,041.60	1,942,800.39	2,273,841.55
Total		1,077,201.79	2,616,513.85	3,693,715.64	1,028,195.39	3,330,389.22	8,052,300.25	2,210,385.21		222,664.82		1,682.01	3,343,726.66	5,778,458.70	331,041.60	1,942,800.39	2,273,841.55
State	1916.																
	July	1,751,264.43	4,047,754.37	5,799,018.80	27,136.51	201,259.95		111,951.40		2,456.07			47,575.51	161,982.98			
	August				171,399.56	76,868.30		98,901.09		2,014.88			65,600.90	166,519.93			
	September				96,806.92	37,084.71		205,862.79		7,173.07			121,693.73	334,729.59			
	October				216,799.13	132,103.56		110,695.81		1,979.19			25,231.84	137,906.84			
	November				19,912.97	236,895.14		55,595.82		3,748.43			352,647.89	411,992.14			
	December				32,764.16	104,844.26		102,804.00		2,954.49			110,223.28	215,981.77			
	1917.																
	January				52,667.44	124,210.14		68,522.75		7,161.18			145,596.19	221,280.12			
	February				75,871.60	153,342.59		125,442.16		2,356.01			165,255.71	293,053.88			
	March				602,447.58	149,871.46		68,157.18		642.74			728,854.48	797,954.40			
	April				37,865.30	245,726.78		97,849.68		1,082.35			96,813.47	195,745.50			
	May				117,259.63	366,817.64		81,885.63		2,637.41			97,232.79	181,755.83			
	June				117,959.18	220,585.28	9,417,858.59	105,952.33		566.00			376,873.25	483,391.58	2,984,992.49	2,830,571.54	5,815,564.03
Total		1,751,264.43	4,047,754.37	5,799,018.80	1,568,889.98	2,049,949.81	9,417,858.59	1,233,923.64		34,771.82			2,333,599.10	3,602,294.56	2,984,992.49	2,830,571.54	5,815,564.03
Miscellaneous	1916.																
	July	406,373.80	970,258.41	1,376,632.25	2,047.62	1,318.42		49,132.00		12,640.78			1,666.32	63,439.10			
	August				16,239.98	760.00		3,313.85		883.40			1,120.00	5,317.25			
	September				40,704.24	3,103.98		3,812.59		12,012.95			1,195.02	17,020.56			
	October				1,720.00	1,320.00				2,320.00			6,402.90	8,722.90			
	November				1,884.46	1,489.04		2,986.66		1,280.28			2,000.00	6,266.94			
	December				79,969.38			633.91		87.36			3,400.38	4,121.65			
	1917.																
	January				667.51	5,840.66		25,895.93		19,942.60			640.00	46,478.53			
	February				10,502.52			11,511.36		11,872.43			757.15	24,140.94			
	March				639.80	358,517.24		520.00		5,644.00			1,080.00	7,244.00			
	April				3,892.65	1,040.23				1,760.00			1,280.00	3,040.00			
	May					320.00		640.00		3,497.65			6,464.02	10,601.67			
	June				106,762.50	5,164.65	2,020,707.13	16,986.91		101,370.37			1,606.22	119,963.50	332,944.45	1,371,405.64	1,704,350.09
Total		406,373.80	970,258.41	1,376,632.25	265,130.66	378,944.22	2,020,707.13	115,433.21		173,311.82			27,612.01	316,357.01	332,944.45	1,371,405.64	1,704,350.09
Carey Act segregation	1916.																
	July	680,045.79	675,285.31	1,355,331.10													
	August							248.74		3,439.12				3,687.86			
	September									40.00				40.00			
	October				676.32					356.51				356.51			
	November																
	December																
	1917.																
	January																
	February																
	March																
	April																
	May				5,440.00									10,198.82	309,182.95	1,045,181.56	1,354,364.51
	June				7,500.28		1,368,947.70	2,998.54		7,500.28				14,583.19	309,182.95	1,045,181.56	1,354,364.51
Total		680,045.79	675,285.31	1,355,331.10	13,616.60		1,368,947.70	3,247.28		11,335.91							
Aggregate		3,914,885.81	8,309,811.98	12,224,697.79	2,875,832.63	5,759,283.25	20,859,813.67	3,562,989.34		442,084.37		1,682.01	5,704,937.77	9,711,693.49	3,958,161.49	7,189,959.13	11,148,120.18

Consolidated work report for fiscal year, 1917, by divisions.

	Divisions.	Pending July 1, 1916. For office action.	Pending July 1, 1916. For action elsewhere.	Pending July 1, 1916. Total.	Received. From outside of office.	Received. By reference from other divisions.	Total pending at beginning of year and received during the year.	Disposed of. Approved. Patent.	Disposed of. Approved. Other.	Disposed of. Canceled.	Disposed of. Patented.	Disposed of. Otherwise.	Disposed of. Referred to other divisions.	Disposed of. Total.	Pending June 30, 1917. For office action.	Pending June 30, 1917. For action elsewhere.	Pending June 30, 1917. Total.
Cases of all kinds	B	1,175		1,175		[illegible]	56,204				54,124		730	54,854	1,350		1,350
	C	4,445	6,544	10,989		[illegible]	103,327	34,085		2,062		26,838	15,781	78,766	16,412	8,149	24,561
	D	873		873		136,860	137,733						135,378	135,378	2,355		2,355
	E	121	818	939	2,734		3,673		3,124	24		1,677	1,341	5,300	2,382	6,007	8,389
	F	381	1,274	1,655	1,184	10,850	13,689	1,642		640		9,008	21,480	38,726	289	898	1,187
	G	7,200	13,098	20,298	4,919	11,696	39,913	5,604		2,544		737	140	5,943	578	824	1,402
	H	408	883	1,291		6,054	7,345	68		4,908		3,409	1,528	10,513	6,596	9,082	15,678
	K	3,380	1,201	4,581	156	21,854	26,191	5,318		258		151	175	833	6		6
	L	85	43	128	573	138	839		507			1,138	250,991	258,061	3,506	288	3,794
	M	5,477	173	5,650	256,205		261,855		5,932			1,213	537	2,521	517	1,203	1,720
	N	1,302	277	1,579	10	2,652	4,241	598		173			212,401	272,149	26,068		26,068
	O	12,431		12,431		285,786	298,217		59,748				6,359	12,823	1,725	11,327	13,052
	FS	891	11,400	12,291	816	12,768	25,875	2,136	5	649		3,683					
Total		38,169	35,711	73,880	266,597	638,625	979,102	49,451	69,316	11,318	54,124	47,944	646,832	879,015	62,028	38,059	100,087

SELECTIONS—AREA IN ACRES.

Railroads and wagon roads	F	1,074,375.45	2,616,513.85	3,690,889.30	551,567.27	418,801.90	4,661,258.37	1,541,288.93		210,391.29		1,032.01	2,898,546.14	4,651,258.37			
	G				13,225.70	2,911,587.42	2,924,813.12	669,096.28		12,273.53		650.00	[illegible]	682,019.81	299,992.92	1,942,800.39	2,242,793.31
	M	2,826.34		2,826.34	463,402.42		466,228.76						43,180.52	435,180.52	31,048.24		31,048.24
Total		1,077,201.79	2,616,513.85	3,693,715.64	1,028,195.39	3,330,389.32	8,052,300.25	2,210,385.21		222,664.82		1,682.01	3,[illegible]726.66	5,778,458.70	331,041.16	1,942,800.39	2,273,841.55
State	G	1,667,253.96	3,454,133.29	5,121,387.25		1,605,610.14	6,726,997.39	1,233,923.64		31,771.82			4[illegible]37.52	1,710,032.98	2,945,198.13	2,041,466.28	4,986,964.41
	M	2,244.44		2,244.44	1,568,889.98		1,571,134.42						1,[illegible]71.42	1,570,974.42	160.00		160.00
	FS	81,766.03	593,621.08	675,387.11		444,339.67	1,119,726.78						21[illegible]87.16	291,287.16	39,321.36	789,105.26	828,439.62
Total		1,751,264.43	4,047,754.37	5,799,018.80	1,568,889.98	2,049,949.81	9,417,858.59	1,233,923.64		31,771.82			2,[illegible]99.10	3,602,294.56	2,984,992.49	2,830,571.54	5,815,564.03
Miscellaneous	F	142,785.88	575,280.46	718,066.34	261,064.35	12,141.49	991,272.18	90,613.82		115,233.32				205,847.14	168,242.03	617,183.01	785,425.04
	G	259,944.32	62,734.74	322,679.06	3,027.31		325,706.37	24,819.39		57,795.10				82,614.49	162,534.21	80,557.67	243,091.88
	H	1,120.00	41,878.18	42,998.18	1,039.00	10,297.32	54,334.50			283.10			610.00	923.40	641.61	52,766.19	53,411.10
	FS	2,523.60	290,365.07	292,888.67		356,507.41	649,394.08						26,972.01	26,972.01	1,523.60	620,898.47	622,422.07
Total		406,373.80	970,258.45	1,376,632.25	265,130.66	378,944.22	2,020,707.13	115,433.21		173,311.82			[illegible]12.01	316,357.04	332,944.45	1,371,405.64	1,704,350.09
Carey Act—Segregation	F	650,045.79	675,285.31	1,355,331.10	13,616.60		1,368,947.70	3,247.28		11,335.91				14,583.19	300,182.95	1,045,181.56	1,354,364.51
Aggregate		3,914,885.81	8,309,811.98	12,224,697.79	2,875,832.63	5,759,283.25	20,859,813.67	3,562,989.34		442,084.37		1,682.01	5,[illegible]27.77	9,711,693.49	3,958,161.05	7,189,959.13	11,148,120.18

Consolidated work report, United States surveyors general for fiscal year ended June 30, 1917

Mineral surveys

Pending beginning of year

Received during year

Disposed of

Approved

Pending end of year

Forest homesteads

Pending beginning of year

Received during year

Disposed of

Approval

Pending end of year

Indian reservations

Pending beginning of year

Received during year

Disposed of

By approval

Pending end of year

Miscellaneous surveys

Pending beginning of year

Received during year

Disposed of

Pending end of year

[illegible]

[illegible]

[illegible]

Expenditures during the fiscal year ended June 30, 1917, in connection with surveying activities.

	Salaries, offices of surveyors general.	Contingent expenses, offices of surveyors general.	Surveying the public lands.	Deposits by individuals for surveying public lands.	Surveying within land grants (reimbursable).	Miscellaneous.[1]	Indian surveys.	Total.
Alaska	$13,990.00	$2,353.80	[2] $53,369.18	$4,724.44		$750.43		$75,187.85
Arizona	16,061.61	424.90	50,929.09	2,450.50	$47,215.56		$1,234.10	118,315.76
California	14,976.67	1,206.72	38,216.49	16,276.56	110.00		1,132.74	71,918.18
Colorado	23,369.16	1,550.70	49,404.54	5,610.09				79,934.49
Idaho	18,739.48	819.14	64,764.51	9,537.13			24.44	93,884.70
Montana	22,382.18	705.34	83,193.17	53,968.54	2,615.51		1,886.27	164,751.01
Nebraska			34,554.81					34,554.81
Nevada	12,840.65	265.10	27,522.57	5,641.25	9,493.48			55,763.05
New Mexico	20,510.30	447.65	55,839.26	2,291.00			10,977.98	90,066.19
Oregon	13,068.37	211.15	23,433.11	266.24			1,353.57	38,332.44
South Dakota	5,100.00	83.73		619.73				5,803.46
Utah	17,650.07	865.65	48,961.99	4,462.00		81.00	2,455.12	74,475.83
Washington	10,829.16	373.90	28,274.56	36,070.25	8,951.96	680.58	616.18	85,796.59
Wyoming	12,874.67	219.01	51,741.15	35.00				64,869.83
G. L. O.[3]	36.00	1,094.92	78,900.49	24,781.98	6,383.25	2,667.98	16,127.88	129,992.50
Total	202,428.32	10,621.71	689,104.92	166,734.71	74,769.76	4,177.99	35,808.28	1,183,647.69

[1] Includes "Surveying Public Lands in Alaska," "Surveying Public Lands in Utah," "Surveying Coal lands in Alaska," and "Appraisal and Sale of Abandoned Military Reservations."
[2] Includes expenditures by disbursing officers other than surveyors general in Alaska.
[3] Includes expenditures by disbursing agent at Denver other than surveyor general.

Sales of Indian lands during fiscal year ended June 30, 1917.

Land office—Indian tribe.	Original entries and segregations.		Receipts, sales, and interest.
	Number.	Area.	
		Acres.	
California:			
El Centro—Yuma			$2,161.82
Eureka—Round Valley	22	2,915.00	5,404.72
Los Angeles—Yuma	1	42.42	
San Francisco—Round Valley	288	40,231.53	37,088.96
Colorado:			
Durango—			
Ute (acts June 15, 1880, and July 28, 1882)	59	9,196.68	6,427.77
Southern Ute (act Feb. 20, 1895)	196	32,520.35	2,199.76
Glenwood Springs—Ute (acts June 15, 1880, and July 28, 1882)	252	44,344.23	16,876.98
Montrose—Ute (acts June 15, 1880, and July 28, 1882)	603	93,593.48	30,678.85
Idaho:			
Blackfoot—Pocatello town lots			10.00
Coeur d'Alene—			
Coeur d'Alene town lots			5,049.24
Coeur d'Alene (act June 21, 1906)	18	1,718.80	19,136.20
Kansas:			
Dodge City—Osage	3	119.81	299.60
Topeka—Pottawatomie			3,793.98
Minnesota:			
Cass Lake—Chippewa	243	24,714.29	80,797.96
Crookston—			
Chippewa	448	63,384.44	226,571.38
Red Lake	3	160.00	14,430.55
Duluth—Chippewa	37	4,427.24	4,057.69
Montana:			
Billings—Crow	214	94,356.76	358,770.90
Glasgow—Fort Peck	1,390	302,316.65	414,584.51
Kalispell—Flathead	31	2,078.67	31,863.55
Missoula—Flathead	45	3,236.98	26,388.27
Nebraska:			
O'Neill—Omaha	1	34.20	1,373.65
North Dakota:			
Bismarck—Standing Rock	46	11,185.12	8,706.32
Minot—			
Devils Lake	1	80.00	1,198.70
Fort Berthold	297	42,681.35	171,999.73
Oklahoma:			
Guthrie—			
Wichita	4	396.00	1,216.43
Cheyenne and Arapahoe			32,013.10
Kiowa, Comanche, and Apache	8	1,269.30	38,456.72
Hospital fund			40,369.14
Lawton			640.88
Oregon:			
La Grande—Umatilla	32	1,725.29	2,623.84
Portland—Siletz			5,445.66
South Dakota:			
Gregory—			
Rosebud	183	34,086.86	58,394.75
Pine Ridge	42	8,989.34	4,045.67
Lemmon—Standing Rock	424	87,462.44	167,447.08
Pierre—Lower Brule	1	160.00	312.00
Timber Lake—			
Cheyenne River	602	128,265.16	324,550.32
Standing Rock	194	40,191.64	97,108.81
Utah:			
Vernal—Uintah	784	162,300.26	150,029.82
Washington:			
Spokane—			
Colville	274	45,728.91	10,288.45
Spokane	2	52.95	3,004.43
Waterville—Colville	504	113,958.44	29,765.15
Wyoming:			
Lander—Shoshone	17	1,828.35	8,397.97
Total	7,269	1,399,752.94	2,443,981.31

Entries made and expenses incurred at district land offices during fiscal year ended June 30, 1917.

Location.	Number of applications, entries, etc. (original and final).	Area.			Receipts for allowed applications and entries.[1]				Indian.[2]	Total earnings.[2]	Expenses.		
		Entered.		Patented.	Fees and commissions.		Purchase money.	Total.			Salaries and commissions, registers and receivers.	Incidental.	Total.
		Original.	Final.		Indian lands.	Public lands.							
		Acres.	*Acres.*	*Acres.*									
Alabama, Montgomery	587	14,255.54	28,577.29	22,452.420	.....	$3,502.93	$5,390.25	$8,893.18	.....	$7,787.45	$3,414.40	$1,293.20	$4,707.60
Alaska:													
Fairbanks	379	2,802.32	1,061.64	1,046.259	.....	223.05	45,095.27	45,318.32	.....	53,611.94	932.42	2,437.90	3,370.32
Juneau	737	29,939.08	2,184.92	2,850.869	.....	3,159.09	43,417.42	46,576.51	.....	67,609.78	5,996.38	2,847.80	8,844.18
Nome	60	.....	4,859.43	4,064.104	.....	305.95	15,340.00	15,645.95	.....	16,718.22	645.73	3.20	648.93
Arizona, Phoenix	3,517	1,431,627.45	171,039.43	672,922.148	.....	32,901.50	56,784.44	89,685.94	.....	91,310.20	4,983.33	7,902.75	12,886.08
Arkansas:													
Camden	482	19,831.57	19,882.94	16,777.380	.....	3,399.29	4,818.90	8,218.19	.....	8,221.24	2,953.70	1,462.57	4,416.27
Harrison	1,541	61,985.99	73,530.38	33,028.220	.....	9,653.58	4,262.13	13,915.71	.....	13,899.96	3,164.31	2,360.50	5,524.81
Little Rock	1,372	78,828.29	38,754.87	31,329.250	.....	10,555.65	3,227.09	13,782.74	.....	16,923.50	5,683.79	3,680.66	9,364.45
California:													
El Centro[3]	556	33,033.08	23,042.38	11,420.834	$12.57	4,012.32	32,401.08	36,425.97	$2,161.82	38,117.02	4,547.01	3,398.91	7,945.92
Eureka	256	9,113.93	13,253.22	14,808.615	110.53	1,970.04	11,281.27	13,361.84	5,404.72	18,662.16	2,549.72	10.00	2,559.72
Independence	526	58,021.20	25,730.23	38,139.985	.....	5,228.95	17,085.16	22,314.11	.....	22,116.52	4,818.99	276.00	5,094.99
Los Angeles	1,995	197,927.98	82,408.30	96,731.164	8.18	21,788.92	52,872.57	74,669.67	.....	68,830.56	6,000.00	8,268.74	14,268.74
Sacramento	1,404	123,939.72	54,862.79	40,903.080	.....	16,963.82	27,053.35	44,017.17	.....	43,421.91	6,000.00	4,375.00	10,375.00
San Francisco	1,092	121,410.73	35,413.11	56,224.241	1,556.05	13,430.50	21,445.15	36,431.70	37,088.96	76,514.33	6,000.00	3,494.00	9,494.00
Susanville	436	51,653.71	21,182.43	9,847.189	.....	4,886.69	9,785.73	14,672.42	.....	13,322.35	3,561.07	1,729.70	5,290.77
Visalia	891	116,675.25	31,049.38	38,592.342	.....	12,427.67	17,937.72	30,365.39	.....	29,697.78	6,000.00	3,490.00	9,490.00
Indian and private land grants	.....	.....	.....	4,861.180	.....	.....	.....	.....	.....	.....	.....	.....	.....
Colorado:													
Del Norte	319	33,807.32	14,550.70	12,707.543	.....	3,137.10	10,168.58	13,305.68	.....	9,535.90	2,878.52	666.20	3,544.72
Denver	1,997	185,607.36	170,197.19	141,903.356	.....	25,053.51	47,046.30	72,099.81	.....	74,159.64	6,000.00	5,550.00	11,550.00
Durango	391	29,482.10	13,464.08	27,777.174	3,804.33	4,195.87	10,212.46	18,212.66	8,627.53	25,782.64	6,000.00	1,961.25	7,961.25
Glenwood Springs	983	138,977.63	38,210.96	66,247.059	3,431.18	12,891.06	24,384.78	40,707.02	16,876.98	43,566.88	6,000.00	3,674.86	9,674.86
Hugo	688	47,270.23	80,806.66	104,450.100	.....	10,151.81	4,444.25	14,596.06	.....	14,604.95	6,000.00	3,550.00	9,550.00
Lamar	2,841	440,768.11	249,018.79	203,824.390	.....	43,577.24	23,031.88	66,609.12	.....	65,642.73	6,000.00	6,241.24	12,241.24
Leadville	235	24,040.43	7,025.13	6,449.080	.....	3,000.81	8,367.90	11,368.71	.....	12,113.01	2,821.84	177.28	2,999.12
Montrose	614	32,953.14	31,006.90	42,912.632	7,113.66	5,930.21	8,274.94	21,318.81	30,678.85	51,175.41	6,000.00	3,276.50	9,276.50
Pueblo	4,355	757,162.65	202,063.71	158,651.367	.....	63,857.04	45,541.29	109,398.33	.....	124,070.67	6,000.00	6,387.08	12,387.08
Sterling	2,640	222,982.02	311,766.18	308,014.260	.....	33,090.63	19,237.79	52,328.42	.....	54,948.39	6,000.00	5,273.58	11,273.58
Indian and private land grants	.....	.....	.....	710.780	.....	.....	.....	.....	.....	.....	.....	.....	.....
District of Columbia	.....	.....	.....	.105	.....	.....	.....	.....	.....	.....	.....	.....	.....

Entries made and expenses incurred at district land offices during fiscal year ended June 30, 1917—Continued.

Location.	Number of applications, entries, etc. (original and final).	Area.			Receipts for allowed applications and entries.				Indian.	Total earnings.	Expenses.		
		Entered.		Patented.	Fees and commissions.		Purchase money.	Total.			Salaries and commissions, registers and receivers.	Incidental.	Total.
		Original.	Final.		Indian lands.	Public lands.							
		Acres.	*Acres.*	*Acres.*									
Florida, Gainesville	1,113	43,624.78	68,033.28	64,906.745		$7,943.88	$11,676.55	$19,620.43		$19,439.47	$5,910.65	$4,456.13	$10,366.78
Idaho:													
Blackfoot	3,067	282,894.28	271,672.16	228,554.757		34,504.05	45,960.90	80,464.95	$10.00	85,950.31	6,000.00	7,427.50	13,427.50
Boise	1,744	155,613.23	98,650.93	81,788.879		15,530.32	26,042.05	41,572.37		42,974.62	6,000.00	4,702.00	10,702.00
Coeur d'Alene	316	20,479.12	17,113.05	34,170.348	$890.41	4,050.20	11,929.59	16,870.20	24,185.44	41,441.19	5,696.60	2,914.67	8,611.27
Hailey	2,211	180,172.82	173,354.32	165,732.592		20,715.48	26,551.02	47,266.50		64,355.72	6,000.00	6,171.17	12,171.17
Lewiston	479	128,577.30	30,802.81	31,651.781		6,250.61	6,380.24	12,630.85		12,428.14	5,618.87	1,560.00	7,178.87
Indian and private land grants				51,430.690									
Illinois				80.000									
Indiana				267.730									
Iowa				280.630									
Kansas:													
Dodge City	874	97,776.01	44,754.50	38,437.480		10,231.68	4,132.70	14,364.38	299.60	14,660.32	6,000.00	3,220.86	9,220.86
Topeka	236	16,876.57	12,425.52	7,431.300		2,189.86	1,669.37	3,859.23	3,793.98	8,643.50	2,214.47	20.00	2,234.47
Louisiana, Baton Rouge	430	16,545.15	12,356.90	11,143.160		4,326.80	3,591.89	7,918.69		7,768.81	3,957.06	4,144.00	8,101.06
Michigan, Marquette	241	9,570.89	9,083.05	9,423.101		2,100.06	3,160.45	5,260.51		5,671.70	2,461.47	21.00	2,482.47
Minnesota:													
Cass Lake	163	3,025.08	8,133.22	68,123.610	8,198.33	1,583.19	898.85	10,680.37	80,797.96	91,396.88	5,796.70	3,085.23	8,881.93
Crookston	126	4,692.34	10,951.61	181,771.680	23,165.90	1,751.34	879.11	25,796.35	241,001.93	266,752.28	6,000.00	3,564.00	9,564.00
Duluth	515	9,052.51	28,253.94	24,185.960	489.92	3,012.53	12,587.88	16,090.33	4,057.69	22,459.03	3,589.32	1,461.00	5,050.32
Indian and private land grants				12,701.605									
Mississippi:													
Jackson	488	15,205.05	17,282.60	16,536.390		4,074.60	4,400.33	8,474.93		8,687.70	3,912.54	2,102.67	6,015.21
Indian and private land grants				1,685.140									
Missouri, Springfield	118	1,324.89	6,343.25	6,759.075		613.62	2,565.90	3,179.52		3,179.52	1,049.44	955.85	2,005.29
Montana:													
Billings	1,510	115,737.11	176,544.79	327,716.309	5,868.82	24,184.71	6,677.19	36,730.72	358,770.90	400,903.52	6,000.00	4,612.25	10,612.25
Bozeman	1,585	148,314.68	149,321.90	162,716.150		23,581.90	20,525.81	44,107.71		41,627.32	6,000.00	2,127.50	8,127.50
Glasgow	5,232	608,143.84	616,920.44	615,628.986	24,175.25	74,118.52	46,484.66	144,778.43	414,584.51	560,866.47	6,000.00	9,599.17	15,599.17
Great Falls	3,785	281,255.22	377,361.36	332,126.790		39,882.00	81,230.91	121,112.91		106,510.41	6,000.00	8,926.09	14,926.09
Havre	6,493	699,618.60	685,585.94	544,615.585		84,823.18	83,195.33	168,018.51		202,212.18	6,000.00	7,999.02	13,999.02

Helena	2,570	248,233.11	170,757.71	265,657.010		32,682.39	72,208.06	104,890.45		101,751.37	6,000.00	4,581.50	10,581.50
Kalispell	320	55,431.50	12,159.26	35,107.710	466.99	4,062.09	1,141.81	5,670.89	31,863.55	37,632.00	4,650.42	932.17	5,582.59
Lewistown	5,491	442,305.88	530,843.38	372,680.660		61,966.55	74,413.11	136,379.66		135,971.61	6,000.00	9,313.50	15,313.50
Miles City	7,147	1,174,147.17	610,790.90	1,082,850.340		137,335.16	61,294.97	198,630.13		196,032.11	6,000.00	10,338.75	16,338.75
Missoula	445	30,919.43	26,796.78	52,283.279	898.65	6,218.23	9,317.14	16,434.02	26,388.27	42,620.58	6,000.00	2,369.00	8,369.00
Indian and private land grants				26,551.130									
Nebraska:													
Alliance	834	33,579.44	244,168.09	256,580.300		6,606.25	12,069.77	18,676.02		18,706.02	5,941.86	2,810.78	8,752.64
Broken Bow	670	32,304.74	264,602.36	177,348.710		5,021.45	12,716.93	17,738.38		17,747.38	5,173.68	1,763.25	6,936.93
Lincoln	85	5,194.90	4,673.37	2,688.320		863.00	1,765.00	2,628.00		2,689.50	1,544.74	5.50	1,550.24
North Platte	253	7,083.50	78,163.45	41,191.430		2,440.08	2,334.38	4,774.46		4,963.45	3,037.75	1,388.10	4,425.85
O'Neill	101	3,280.37	25,726.49	24,214.080		668.68	1,298.63	1,967.31	1,373.65	3,392.46	1,618.50	1,609.80	3,228.30
Valentine	493	28,347.89	183,831.87	199,437.500		3,780.65	7,354.10	11,134.75		18,126.61	3,983.94	1,834.50	5,818.44
Indian and private land grants				320.000									
Nevada:													
Carson City	511	48,316.43	18,923.52	20,443.350		5,050.58	13,219.33	18,269.91		19,109.38	4,687.29	1,339.97	6,027.26
Elko	483	44,554.86	31,971.78	27,216.120		5,088.78	17,502.42	22,591.20		22,766.46	4,449.38	2,807.72	7,257.10
Indian and private land grants				17.780									
New Mexico:													
Clayton	2,167	237,555.92	197,697.04	153,502.100		28,252.83	11,814.54	40,067.37		40,011.42	6,000.00	6,693.17	12,693.17
Fort Sumner	1,240	239,956.09	58,330.48	51,154.380		19,040.52	3,224.32	22,264.84		22,227.69	6,000.00	4,723.40	10,723.40
Las Cruces	1,274	256,590.74	37,287.81	42,887.935		11,830.05	23,863.37	35,693.42		36,016.77	6,000.00	5,127.18	11,127.18
Roswell	2,065	385,298.33	109,615.18	92,992.449		30,689.54	7,843.87	38,533.41		40,631.08	6,000.00	6,266.00	12,266.00
Santa Fe	2,964	617,047.57	95,937.93	238,548.749		41,873.24	12,575.94	54,449.18		55,682.98	6,000.00	7,554.33	13,554.33
Tucumcari	1,075	114,331.23	88,494.98	68,038.390		13,423.02	5,836.71	19,259.73		19,668.00	6,000.00	5,548.99	11,548.99
Indian and private land grants				6,600.000									
North Dakota:													
Bismarck	629	20,836.18	48,065.60	43,985.520	728.90	5,351.76	2,367.21	8,447.87	8,706.32	17,306.94	5,411.98	3,780.17	9,192.15
Dickinson	1,945	163,948.46	123,167.01	105,973.210		21,738.55	4,422.34	26,160.89		26,260.24	6,000.00	4,588.50	10,588.50
Minot	415	19,082.41	17,694.80	33,598.611	4,561.39	3,248.70	2,845.86	10,655.95	173,198.43	183,904.88	6,000.00	2,843.83	8,843.83
Williston	1,517	63,680.61	137,728.59	112,025.520		10,434.89	408.88	10,843.77		10,865.12	5,827.33	3,531.75	9,359.08
Indian and private land grants				196,510.620									
Ohio				478.450									
Oklahoma, Guthrie	1,013	56,268.90	56,049.60	50,557.419	107.68	8,449.04	12,033.34	20,590.06	112,696.27	137,807.86	5,804.32	2,959.65	8,763.97
Oregon:													
Burns	664	68,873.76	62,715.01	47,037.270		6,907.37	17,104.45	24,011.82		24,422.12	6,000.00	2,204.53	8,204.53
La Grande	1,006	101,697.10	54,520.94	50,166.530		11,593.29	24,288.19	35,881.48	2,623.84	37,509.11	6,000.00	3,182.00	9,182.00
Lakeview	805	65,152.83	90,171.45	112,873.880		8,867.34	16,009.36	24,876.70		26,350.12	6,000.00	1,842.40	7,842.40
Portland	218	8,567.92	13,097.57	13,563.045		2,390.59	3,302.65	5,693.24	5,445.66	11,152.90	2,954.56	2,327.90	5,282.46
Roseburg	463	14,398.89	27,331.68	22,212.550		4,638.54	23,045.53	27,684.07		22,925.08	5,897.75	4,073.36	9,971.11
The Dalles	1,318	107,821.16	119,351.10	111,301.590		13,997.87	19,719.06	33,716.93		33,955.40	6,000.00	3,376.50	9,376.50
Vale	553	60,018.19	40,487.77	29,442.800		6,597.05	12,143.75	18,740.80		18,552.63	5,438.55	1,715.73	1,154.28
Indian and private land grants				1,312.850									

Entries made and expenses incurred at district land offices during fiscal year ended June 30, 1917—Continued.

Location.	Number of applications, entries, etc. (original and final).	Area.			Receipts for allowed applications and entries.				Indian.	Total earnings.	Expenses.		
		Entered.		Patented.	Fees and commissions.		Purchase money.	Total.			Salaries and commissions, registers and receivers.	Incidental.	Total.
		Original.	Final.		Indian lands.	Public lands.							
South Dakota:		*Acres.*	*Acres.*	*Acres.*									
Bellefourche	1,679	182,735.01	92,184.00	85,581.105		$16,603.68	$10,355.17	$26,958.85		$26,816.06	$6,000.00	$6,147.00	$12,147.00
Gregory	20	1,322.50	1,450.23	48,185.890	$4,324.35	1,137.38	743.44	6,205.17	$62,440.42	68,694.98	5,172.06	2,048.25	7,220.31
Lemmon	1,786	158,483.54	106,123.81	117,208.170	7,661.15	16,708.59	8,722.95	33,092.69	167,447.08	201,354.38	6,000.00	5,495.25	11,495.25
Pierre	831	118,435.53	18,307.05	18,290.630	18.00	10,421.38	4,511.01	14,950.39	312.00	14,269.89	5,099.23	1,773.50	6,872.73
Rapid City	3,130	453,194.88	83,268.30	77,529.606		35,927.64	19,547.87	55,475.51		53,720.03	5,625.00	8,014.20	13,639.20
Timber Lake	7			56,348.034	14,595.35	1,031.01		15,626.36	421,659.13	435,288.81	6,000.00	4,083.00	10,083.00
Indian and private land grants				361,313.630									
Utah:													
Salt Lake City	2,012	284,108.66	161,561.23	182,770.194		29,565.01	118,143.58	147,708.59		155,949.56	6,000.00	7,261.99	13,261.99
Vernal	117	14,769.25	3,263.64	15,799.479	1,185.22	1,193.37	5,792.27	8,170.86	150,029.82	157,175.82	5,342.41	540.00	5,882.41
Washington:													
North Yakima	378	119,211.96	14,551.46	21,550.249		5,092.11	6,529.78	11,621.89		10,866.77	5,192.40	1,430.00	6,622.40
Seattle	154	7,322.16	7,765.75	11,235.190		1,688.14	9,939.10	11,627.24		11,796.69	2,815.38	2,376.00	5,191.38
Spokane	651	22,591.95	41,932.09	65,548.107	4,402.58	5,810.46	16,024.71	26,237.75	13,292.88	38,306.05	6,000.00	2,384.00	8,384.00
Vancouver	145	10,178.16	9,677.12	78,947.900		1,538.72	2,454.87	3,993.59		4,704.50	2,390.13	2,121.00	4,511.13
Walla Walla	292	25,541.27	14,865.65	16,384.540		3,851.20	4,625.15	8,476.35		8,528.28	3,658.82	200.50	3,859.32
Waterville	916	88,572.36	53,347.54	51,870.280	9,324.40	8,327.64	9,476.45	27,128.49	29,765.15	58,875.78	6,000.00	3,969.58	9,969.58
Indian and private land grants				282,489.500									
Wisconsin:													
Wausau	205	4,026.53	9,987.58	9,881.430		1,493.48	1,341.61	2,835.09		2,999.16	2,186.38	18.40	2,204.78
Indian and private land grants				599.200									
Wyoming:													
Buffalo	1,225	214,148.11	35,929.81	30,032.730		17,515.93	24,208.40	41,724.33		45,473.62	6,000.00	3,946.50	9,946.50
Cheyenne	2,247	318,950.18	204,854.41	180,231.743		34,769.66	28,898.97	63,668.63		64,247.76	6,000.00	5,281.74	11,281.74
Douglas	1,553	286,318.75	69,286.05	57,962.511		24,379.35	20,194.12	44,573.47		45,910.74	6,000.00	3,414.50	9,414.50
Evanston	607	50,828.15	37,876.53	29,604.601		6,982.16	78,293.51	85,275.67		86,133.94	6,000.00	1,170.83	7,170.83
Lander	714	67,939.86	26,133.13	27,623.077	365.62	6,327.62	25,376.11	32,069.35	8,397.97	47,370.19	6,000.00	2,893.25	8,893.25
Sundance	2,559	515,940.82	113,315.84	124,724.100		41,382.52	20,104.98	61,487.50		59,171.46	6,000.00	3,356.31	9,356.31
Indian and private land grants				554.250									

Made at General Land Office	3		320.47				[4]23,161.99	[4]23,161.99					
Land offices discontinued				2,230.910									
Total	123,585	14,802,041.44	9,247,044.80	11,313,362.242	127,465.41	1,507,618.89	1,897,379.49	3,532,463.79	2,443,981.31	6,054,707.97	493,062.19	344,218.76	837,280.95

[1] Moneys reported under the heading "Receipts for allowed applications and entries" may in several cases exceed the total earnings from all sources for an individual office. This is due to the fact that lands are considered entered only when a certificate of allowance issues. The receipts where the receipts for "Allowed applications and entries" exceed the total earnings of an office include allowances during the fiscal year 1917, whereas its moneys were accounted for and reported as earned during the preceding fiscal year irrespective of whether the papers ever become an entry. This table does not include number and area of Indian Lands. See page 94.

[2] These columns embrace moneys that are credited to the United States; for detailed earnings see following table.

[3] Opened for business Sept. 1, 1916. Known as Imperial Land District. Taken from Los Angeles Land District.

[4] NOTE.—State of California for excess area embraced in State selections $22,810.40 and Iowa for purchase money on final sales $351.59.

Entries made and expenses incurred at district land offices during fiscal year ended June 30, 1917—Continued.

States.—Offices.	Total earnings in detail.							
	Fees and commissions.	Sales of public land.	Total.	Sales of Government property.	Outstanding liabilities—Lands act Mar. 2, 1907.	Sales of reclamation town sites.	Sales of Indian lands.	Aggregate.
Alabama, Montgomery	$3,524.13	$4,263.32	$7,787.45					$7,787.45
Alaska:								
Fairbanks	251.67	53,360.27	53,611.94					53,611.94
Juneau	3,193.19	64,416.59	67,609.78					67,609.78
Nome	317.72	16,400.50	16,718.22					16,718.22
Total	3,762.58	134,177.36	137,939.94					137,939.94
Arizona: Phoenix	33,105.90	58,204.30	91,310.20					91,310.20
Arkansas:								
Camden	3,402.34	4,818.90	8,221.24					8,221.24
Harrison	9,651.68	4,248.28	13,899.96					13,899.96
Little Rock	10,587.63	6,335.87	16,923.50					16,923.50
Total	23,641.65	15,403.05	39,044.70					39,044.70
California:								
El Centro	4,033.12	31,922.08	35,955.20				$2,161.82	38,117.02
Eureka	2,076.17	11,181.27	13,257.44				5,404.72	18,662.16
Independence	5,311.07	16,805.45	22,116.52					22,116.52
Los Angeles	21,937.30	46,893.26	68,830.56					68,830.56
Sacramento	17,047.48	26,374.43	43,421.91					43,421.91
San Francisco	15,074.03	24,303.84	39,377.87		$47.50		37,088.96	76,514.33
Susanville	4,956.62	8,365.73	13,322.35					13,322.35
Visalia	12,706.11	16,991.67	29,697.78					29,697.78
Total	83,141.90	182,837.73	265,979.63		47.50		44,655.50	310,682.63
Colorado:								
Del Norte	3,191.50	6,318.65	9,510.15	$25.75				9,535.90
Denver	25,113.91	49,045.73	74,159.64					74,159.64
Durango	8,276.87	8,878.24	17,155.11				8,627.53	25,782.64
Glenwood Springs	16,179.31	10,510.59	26,689.90				16,876.98	43,566.88
Hugo	10,060.70	4,544.25	14,604.95					14,604.95
Lamar	43,586.93	22,055.80	65,642.73					65,642.73
Leadville	3,025.11	9,087.90	12,113.01					12,113.01
Montrose	13,126.81	7,369.75	20,496.56				30,678.85	51,175.41

Pueblo	63,771.40	60,299.27	124,070.67					124,070.67
Sterling	33,200.84	21,747.55	54,948.39					54,948.39
Total	219,533.38	199,857.73	419,391.11	25.75			56,183.36	475,600.22
Florida, Gainesville	7,948.54	11,490.93	19,439.47					19,439.47
Idaho:								
Blackfoot	34,556.15	51,384.16	85,940.31				10.00	85,950.31
Boise	15,639.83	27,334.79	42,974.62					42,974.62
Coeur d'Alene	4,981.44	11,822.59	16,804.03		451.72		24,185.44	41,441.19
Hailey	21,284.22	38,436.10	59,720.32			4,635.40		64,355.72
Lewiston	6,266.65	6,161.49	12,428.14					12,428.14
Total	82,728.29	135,139.13	217,867.42		451.72	4,635.40	24,195.44	247,149.98
Kansas:								
Dodge City	10,228.02	4,132.70	14,360.72				299.60	14,660.32
Topeka	2,189.12	2,660.40	4,849.52				3,793.98	8,643.50
Total	12,417.14	6,793.10	19,210.24				4,093.58	23,303.82
Louisiana:								
Baton Rouge	4,359.37	3,409.44	7,768.81					7,768.81
Michigan, Marquette	2,175.56	3,496.14	5,671.70					5,671.70
Minnesota:								
Cass Lake	9,795.72	803.20	10,598.92				80,797.96	91,396.88
Crookston	24,894.24	856.11	25,750.35				241,001.93	266,752.28
Duluth	3,544.43	14,730.53	18,274.96		126.38		4,057.69	22,459.03
Total	38,234.39	16,389.84	54,624.23		126.38		325,857.58	380,608.19
Mississippi, Jackson	4,121.37	4,566.33	8,687.70					8,687.70
Missouri, Springfield	613.62	2,565.90	3,179.52					3,179.52
Montana:								
Billings	30,127.90	6,691.50	36,819.40			5,313.22	358,770.90	400,903.52
Bozeman	23,794.12	17,833.20	41,627.32					41,627.32
Glasgow	99,895.85	46,346.11	146,241.96		40.00		414,584.51	560,866.47
Great Falls	38,777.59	66,587.66	105,365.25	15.00	543.82	586.34		106,510.41
Havre	85,076.55	116,388.88	201,465.43			746.75		202,212.18
Helena	33,010.63	68,740.74	101,751.37					101,751.37
Kalispell	4,626.64	1,141.81	5,768.45				31,863.55	37,632.00
Lewistown	62,112.72	73,858.89	135,971.61					135,971.61
Miles City	137,981.60	57,813.63	195,795.23	84.00	[1] 152.88			196,032.11
Missoula	7,478.65	8,648.39	16,127.04		105.27		26,388.27	42,620.58
Total	522,882.25	464,050.81	986,933.06	99.00	841.97	6,646.31	831,607.23	1,826,127.57

[1] Originally credited as sales of Indian lands.

Entries made and expenses incurred at district land offices during fiscal year ended June 30, 1917—Continued.

States.—Offices.	Total earnings in detail.							
	Fees and commissions.	Sales of public land.	Total.	Sales of Government property.	Outstanding liabilities—Lands act Mar. 2, 1907.	Sales of reclamation town sites.	Sales of Indian lands.	Aggregate.
Nebraska:								
Alliance	$6,636.25	$12,069.77	$18,706.02					$18,706.02
Broken Bow	5,020.95	12,716.93	17,737.88	$9.50				17,747.38
Lincoln	924.50	1,765.00	2,689.50					2,689.50
North Platte	2,436.08	2,517.37	4,953.45	10.00				4,963.45
O'Neill	720.18	1,298.63	2,018.81				$1,373.65	3,392.46
Valentine	3,782.10	14,344.51	18,126.61					18,126.61
Total	19,520.06	44,712.21	64,232.27	19.50			1,373.65	65,625.42
Nevada:								
Carson City	5,406.98	13,702.40	19,109.38					19,109.
Elko	4,973.52	17,792.94	22,766.46					22,766.46
Total	10,380.50	31,495.34	41,875.84					41,875.84
New Mexico:								
Clayton	28,317.61	11,693.81	40,011.42					40,011.42
Fort Sumner	18,981.57	3,224.12	22,205.69		$22.00			22,227.69
Las Cruces	11,739.20	24,277.57	36,016.77					36,016.77
Roswell	30,497.36	10,133.72	40,631.08					40,631.08
Santa Fe	43,031.84	12,651.14	55,682.98					55,682.98
Tucumcari	13,931.15	5,736.85	19,668.00					19,668.00
Total	146,498.73	67,717.21	214,215.94		22.00			214,237.94
North Dakota:								
Bismarck	6,256.86	2,343.76	8,600.62				8,706.32	17,306.94
Dickinson	21,837.90	4,422.34	26,260.24					26,260.24
Minot	7,836.59	2,845.86	10,682.45		24.00		173,198.43	183,904.88
Williston	10,456.24	408.88	10,865.12					10,865.12
Total	46,387.59	10,020.84	56,408.43		24.00		181,904.75	238,337.18
Oklahoma, Guthrie	8,616.72	16,450.07	25,066.79		44.80		112,696.27	137,807.86

Oregon:								
Burns	7,202.57	17,219.55	24,422.12					24,422.12
La Grande	11,579.96	23,305.31	34,885.27				2,623.84	37,509.11
Lakeview	9,345.12	17,005.00	26,350.12					26,350.12
Portland	2,404.59	3,302.65	5,707.24				5,445.66	11,152.90
Roseburg	5,688.10	17,236.98	22,925.08					22,925.08
The Dalles	14,174.84	19,759.06	33,933.90		21.50			33,955.40
Vale	6,589.41	11,963.22	18,552.63					18,552.63
Total	56,984.59	109,791.77	166,776.36		21.50		8,069.50	174,867.36
South Dakota:								
Bellefourche	16,743.00	8,481.31	25,224.31			1,591.75		26,816.06
Gregory	5,511.12	743.44	6,254.56				62,440.42	68,694.98
Lemmon	24,405.39	9,501.91	33,907.30				167,447.08	201,354.38
Pierre	9,442.88	4,511.01	13,953.89		4.00		312.00	14,269.89
Rapid City	35,002.19	18,633.84	53,636.03		84.00			53,720.03
Timber Lake	13,629.68		13,629.68				421,659.13	435,288.81
Total	104,734.26	41,871.51	146,605.77		88.00	1,591.75	651,858.63	800,144.15
Utah:								
Salt Lake City	29,721.78	126,227.78	155,949.56					155,949.56
Vernal	2,365.73	4,780.27	7,146.00				150,029.82	157,175.82
Total	32,087.51	131,008.05	163,095.56				150,029.82	313,125.38
Washington:								
North Yakima	5,102.61	5,742.16	10,844.77		22.00			10,866.77
Seattle	1,856.59	9,940.10	11,796.69					11,796.69
Spokane	10,254.20	14,758.97	25,013.17				13,292.88	38,306.05
Vancouver	1,592.88	3,111.62	4,704.50					4,704.50
Walla Walla	3,893.13	4,635.15	8,528.28					8,528.28
Waterville	17,739.88	11,370.75	29,110.63				29,765.15	58,875.78
Total	40,439.29	49,558.75	89,998.04		22.00		43,058.03	133,078.07
Wisconsin, Wausau	1,557.55	1,441.61	2,999.16					2,999.16
Wyoming:								
Buffalo	17,729.72	27,743.90	45,473.62					45,473.62
Cheyenne	34,867.46	29,380.30	64,247.76					64,247.76
Douglas	24,614.15	21,269.09	45,883.24	27.50				45,910.74
Evanston	7,047.31	79,086.63	86,133.94					86,133.94
Lander	6,730.19	14,065.12	20,795.31		5.89	18,171.02	8,397.97	47,370.19
Sundance	41,474.44	17,697.02	59,171.46					59,171.46
Total	132,463.27	189,242.06	321,705.33	27.50	5.89	18,171.02	8,397.97	348,307.71
Aggregate all States	1,641,860.14	1,935,954.53	3,577,814.67	171.75	1,695.76	31,044.48	2,443,981.31	6,054,707.97

Entries made and expenses incurred at district land offices during fiscal year ended June 30, 1917—Continued.

States.—Offices.	Total earnings in detail.								
	Fees and commissions.	Sales of public land.	Total.	Miscellaneous receipts.	Sales of Government property.	Outstanding liabilities—Lands act Mar. 2, 1907.	Sales of reclamation town sites.	Sales of Indian lands.	Aggregate.
Sales of public lands—General Land Office				$23,161.99					$23,161.99
Depredations, public				38,639.43					38,639.43
Power permits				4,996.93					4,996.93
Timber, Ute Indian lands								$1,448.08	1,448.08
Maps, Indian								.25	.25
Copies of records, General Land Office				20,141.79					20,141.79
Copies of records, surveyors' general offices				5,253.82					5,253.82
Sales of Government property, field				1,047.76					1,047.76
Sales of fire-killed timber, public lands				232.52					232.52
Aggregate	$1,641,860.14	$1,935,954.53	$3,577,814.67	93,474.24	$171.75	$1,695.76	$31,044.48	$2,445,429.64	$6,149,630.54

NOTE.—"Total earnings" are receipts credited to United States.

RECAPITULATION BY STATES.

	Number of applications, entries, etc. (original and final.)	Area.			Receipts from allowed applications and entries.				Indian.	Total. earnings.	Expenses.		
		Entered.		Patented.	Fees and commissions.		Purchase money.	Total.			Salaries and commissions, registers and receivers.	Incidental.	Total.
		Original.	Final.		Indian lands.	Public lands.							
		Acres.	*Acres.*	*Acres.*									
Alabama	587	14,255.54	28,577.29	22,452.420	.....	$3,502.93	$5,390.25	$8,893.18	.....	$7,787.45	$3,414.40	$1,293.20	$4,707.60
Alaska	1,176	32,741.40	8,105.99	7,961.232	.....	3,688.09	103,852.69	107,540.78	.....	137,939.94	7,574.53	5,288.90	12,863.43
Arizona	3,517	1,431,627.45	171,039.43	672,922.148	.....	32,901.50	56,784.44	89,685.94	.....	91,310.20	4,983.33	7,902.75	12,886.08
Arkansas	3,395	160,645.85	132,168.19	81,334.830	.....	23,608.52	12,308.12	35,916.64	.....	39,044.70	11,801.80	7,503.73	19,305.53
California	7,156	711,775.60	286,941.84	311,528.630	$1,687.33	80,708.91	189,862.03	272,258.27	$44,655.50	310,682.63	39,476.79	25,042.35	64,519.14
Colorado	15,063	1,913,050.99	1,118,110.30	1,073,64.741	14,349.17	204,885.28	200,710.17	419,944.62	56,183.36	475,600.22	53,700.36	36,757.99	90,458.35
District of Columbia	.....	.....	.....	.105	.....	.....	.....	.....	.....	.....	.....	.....	.....
Florida	1,113	43,624.78	68,033.28	64,906.745	.....	7,943.88	11,676.55	19,620.43	.....	19,439.47	5,910.65	4,456.13	10,366.78
Idaho	7,817	767,736.75	591,593.27	593,329.047	890.41	81,050.66	116,863.80	198,804.87	24,195.44	247,149.98	29,315.47	22,775.34	52,090.81
Illinois	.....	.....	.....	80.000	.....	.....	.....	.....	.....	.....	.....	.....	.....
Indiana	.....	.....	.....	267.730	.....	.....	.....	.....	.....	.....	.....	.....	.....
Iowa	.....	.....	.....	280.630	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kansas	1,110	114,652.58	57,180.02	46,028.780	.....	12,421.54	5,802.07	18,223.61	4,093.58	23,303.82	8,214.47	3,240.86	11,455.33
Louisiana	430	16,545.15	12,356.90	11,806.870	.....	4,326.80	3,591.89	7,918.69	.....	7,768.81	3,957.06	4,144.00	8,101.06
Michigan	241	9,570.89	9,083.05	9,423.101	.....	2,100.06	3,160.45	5,260.51	.....	5,671.70	2,461.47	21.00	2,482.47
Minnesota	804	16,769.93	47,338.77	286,782.855	31,854.15	6,347.06	14,365.84	52,567.05	325,857.58	380,608.19	15,386.02	8,110.23	23,496.25
Mississippi	488	15,205.05	17,282.60	18,590.610	.....	4,074.60	4,400.33	8,474.93	.....	8,687.70	3,912.54	2,102.67	6,015.21
Missouri	118	1,324.89	6,343.25	6,776.575	.....	613.62	2,565.90	3,179.52	.....	3,179.52	1,049.44	955.85	2,005.29
Montana	34,578	3,804,106.54	3,357,082.46	3,817,933.949	31,409.71	488,854.73	456,488.99	976,753.43	831,607.23	1,826,127.57	58,650.42	60,798.95	119,449.37
Nebraska	2,436	109,790.84	801,165.63	701,780.340	.....	19,380.11	37,538.81	56,918.92	1,373.65	65,625.42	21,300.47	9,411.93	30,712.40
Nevada	994	92,871.29	50,895.30	47,677.250	.....	10,139.36	30,721.75	40,861.11	.....	41,875.84	9,136.67	4,147.69	13,284.36
New Mexico	10,785	1,850,779.88	587,363.42	653,724.003	.....	145,109.20	65,158.75	210,267.95	.....	214,237.94	36,000.00	35,913.07	71,913.07
North Dakota	4,506	267,547.66	326,656.00	492,093.481	5,290.29	40,773.90	10,044.29	56,108.48	181,904.75	238,337.18	23,239.31	14,744.25	37,983.56
Ohio	.....	.....	.....	478.450	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oklahoma	1,013	56,268.90	56,049.60	50,850.719	107.68	8,449.04	12,033.34	20,590.06	112,696.27	137,807.86	5,804.32	2,959.65	8,763.97
Oregon	5,027	426,529.85	407,675.52	387,910.515	.....	54,992.05	115,612.99	170,605.04	8,069.50	174,867.36	38,290.86	18,722.42	57,013.28
South Dakota	7,453	914,171.46	301,333.39	764,457.065	26,598.85	81,829.68	43,880.44	152,308.97	651,858.63	800,144.15	33,896.29	27,561.20	61,457.49
Utah	2,129	298,877.91	164,824.87	198,569.673	1,185.22	30,758.38	123,935.85	155,879.45	150,029.82	313,125.38	11,342.41	7,801.99	19,144.40
Washington	2,536	273,417.86	142,140.61	528,393.106	13,726.98	26,308.27	49,050.06	89,085.31	43,058.03	133,078.07	26,056.73	12,481.08	38,537.81
Wisconsin	205	4,026.53	9,987.58	10,640.630	.....	1,493.48	1,341.61	2,835.09	.....	2,999.16	2,186.38	18.40	2,204.78
Wyoming	8,905	1,454,125.87	487,395.77	450,733.012	365.62	131,357.24	197,076.09	328,798.95	8,397.97	348,307.71	36,000.00	20,063.13	56,063.13
Made at General Land Office	3	.....	320.47	.....	.....	.....	23,161.99	23,161.99	.....	.....	.....	.....	.....
Total	123,585	14,802,041.44	9,247,044.80	11,313,362.242	127,465.41	1,507,618.89	1,897,379.49	3,532,463.79	2,443,981.31	6,054,707.97	493,062.19	344,218.76	837,280.95

Entries made and expenses incurred at district land offices during fiscal year ended June 30, 1917—Continued.

	Number of applications, entries, etc. (original and final.)	Area.			Receipts from allowed applications and entries.				Indian.	Total. earnings.	Expenses.		
		Entered.		Patented.	Fees and commissions.		Purchase money.	Total.			Salaries and commissions, registers and receivers.	Incidental.	Total.
		Original.	Final.		Indian lands.	Public lands.							
		Acres.	*Acres.*	*Acres.*									
Sales of public land										$23,161.99			
Depredations, public										38,639.43			
Power permits, etc										4,996.93			
Timber, Ute Indian lands									$1,448.08	1,448.08			
Maps, Indian									.25	.25			
Copies of records, etc										20,141.79			
Copies of records, surveyors, general offices										5,253.82			
Sales of fire-killed timber, public lands										232.52			
Sales of Government property, field										1,047.76			
Aggregate	123,585	14,802,041.44	9,247,044.80	11,313,362.242	$127,465.41	$1,507,618.89	$1,897,379.49	$3,532,463.79	2,445,529.64	6,149,630.54	$493,062.19	$344,218.76	$837,280.95

RECAPITULATION, BY CLASSES, OF ENTRIES.

State or Territory.	At public auction.			Subject to preemption entry.			Timber and stone.			Mineral.			Coal.		
	Entries.	Acres.	Amount.	Entries.	Acres.	Amount.	Entries.	Acres.	Amount.	Entries.	Acres.	Amount.	Entries.	Acres.	Amount.
Alabama							16	1,073.39	$3,553.66						
Alaska										49	5,054.73	$14,012.50	3	580.28	$5,808.40
Arizona	27	3,997.74	$7,885.50				2	240.00	772.66	49	3,022.32	14,504.94			
Arkansas	14	512.12	1,110.82				16	1,078.52	4,749.17	5	230.00	575.00			
California	162	11,946.54	29,787.21				85	9,048.10	25,926.69	102	6,042.71	18,180.00			
Colorado	340	26,990.00	60,033.34				50	5,459.41	15,970.28	81	2,918.15	13,327.50	2	200.00	16,680.00
Florida	5	234.29	1,040.02				3	227.08	926.60	1	40.06	102.50			
Idaho	69	5,411.09	16,487.78				14	1,400.48	4,803.63	34	2,945.24	12,700.00			
Kansas	12	481.65	1,142.75												
Louisiana							2	332.12	880.00						
Michigan	1	40.00	50.00				13	844.00	2,530.85						
Minnesota	9	286.13	1,461.65				45	3,377.44	9,195.67						
Mississippi							14	820.51	3,001.93						
Montana	779	57,818.03	188,296.60	6	221.40	$503.53	80	10,088.38	30,792.13	132	5,428.99	21,227.50	15	567.80	11,143.00
Nebraska	110	8,185.40	29,558.62				1	.13	25.00	1	10.00	25.00			
Nevada	12	935.04	1,711.61				1	39.82	99.55	32	2,349.12	11,787.50			
New Mexico	154	11,338.71	20,524.04							51	1,844.91	9,355.00	1	159.81	3,200.00
North Dakota	27	1,156.59	4,394.56										5	240.00	3,600.00
Oklahoma	57	5,300.10	1,967.32												
Oregon	201	17,142.29	44,652.85				61	6,697.15	21,887.81	6	141.34	590.00	7	840.00	16,640.00
South Dakota	54	3,530.32	10,755.69				1	40.00	100.00	3	222.56	1,120.00	3	220.00	2,200.00
Utah	13	1,400.00	4,400.00							31	1,827.47	6,612.00	4	629.94	100,225.15
Washington	66	4,210.00	12,880.92				38	4,355.96	17,049.50	11	584.10	2,345.10			
Wisconsin							3	160.00	500.00						
Wyoming	206	19,928.01	44,627.75				40	4,622.61	12,702.63	11	1,223.58	3,506.35	11	781.71	70,334.95
Total	2,318	180,844.05	482,769.03	6	221.40	503.53	485	49,905.10	155,467.76	599	33,885.28	129,970.89	51	4,219.54	229,831.50

Entries made and expenses incurred at district land offices during fiscal year ended June 30, 1917—Continued.

RECAPITULATION, BY CLASSES, OF ENTRIES—Continued.

State.	Disposition of abandoned military reservations.										Excess area payments.		
	Sale.			Homestead law.									
				Original.			Final.						
	No.	Acres.	Amount.	No.	Acres.	Fees and commissions.	No.	Acres.	Fees and commissions.	Purchase money.	No.	Acres.	Amount.
Alabama											7	10.25	$12.83
Arizona	3	332.36	$415.42				4	623.13	$6.00	$203.61	48	275.80	387.02
Arkansas											75	382.33	475.51
California											330	1,784.57	2,917.84
Colorado											806	3,361.32	4,560.06
Florida							4	339.01	4.00	197.50	40	176.07	217.03
Idaho											240	1,311.34	1,739.95
Kansas											32	112.95	211.79
Louisiana											17	87.84	135.82
Michigan											3	19.28	24.15
Minnesota											9	74.33	120.06
Mississippi											7	22.40	28.06
Montana				482	74,384.50	$7,523.41	4	505.24	18.95	320.00	938	5,492.96	8,284.12
Nebraska							8	1,423.90	32.00	3,275.34	19	92.32	130.29
Nevada											38	457.40	596.59
New Mexico	1	1,435.52	1,794.40	1	158.80	16.00					363	1,450.21	1,841.26
North Dakota											71	334.42	621.73
Oregon											144	784.49	988.23
South Dakota											210	873.98	994.05
Utah							1	156.35		117.27	72	346.85	446.05
Washington											43	207.63	380.76
Wisconsin											2	25.36	40.19
Wyoming							2	219.98	16.50	175.09	520	2,332.16	3,041.18
Total	4	1,767.88	2,209.82	483	74,543.30	7,539.41	23	3,267.61	77.45	4,288.81	4,034	20,016.26	28,194.57

State.	Desert land entries.													
	Number.		Acres.		Amount.		Desert land relief, act of Mar. 4, 1915.							
							Elections to purchase.			Final.			Final proof in the manner required of a homestead entryman.	
	Original.	Final.	Original	Final.	Original.	Final.	No.	Acres.	Amount.	No.	Acres.	Amount.	No.	Acres.
Arizona	98	33	$16,336.86	$5,459.39	$4,084.74	$5,523.80	84	16,682.92	$8,341.46	13	2,759.47	$2,069.60	7	1,600.72
California	479	200	77,048.48	29,365.54	19,258.13	29,338.77	144	31,328.32	15,664.16	7	1,760.00	1,320.00	2	320.00
Colorado	62	130	9,688.36	21,756.29	2,425.82	21,768.52	479	89,264.24	44,632.12	48	8,659.39	6,479.09	13	2,971.03
Idaho	166	108	24,639.66	15,077.40	6,161.77	15,076.35	161	26,000.06	13,000.03	12	1,769.23	1,327.22	2	400.00
Montana	106	281	17,623.90	49,928.90	4,419.42	50,088,00	505	80,356.20	40,178.10	292	47,195.75	35,749.57	18	3,428.86
Nevada	63	58	10,794.46	10,502.54	2,698.50	10,501.15	6	998.12	499.06				1	360.00
NewMexico	48	28	7,944.19	4,011.87	1,990.16	4,012.40	99	18,590.10	9,295.05	9	1,552.00	1,164.74	5	612.17
North Dakota	1	1	120.00	320.00	30.00	320.00				1	160.00	120.00		
Oregon	36	36	4,749.32	5,537.48	1,187.35	5,536.93	105	20,180.76	10,090.38	16	3,503.31	2,628.49	11	1,735.75
South Dakota	2	8	78.46	949.76	19.62	949.76	183	27,537.72	13,768.86	37	5,318.04	4,128.22	5	960.00
Utah	51	29	6,835.61	2,966.36	1,709.28	2,967.29	49	9,720.46	4,860.23	5	1,104.20	828.18	1	181.21
Washington	11	25	1,360.00	2,361.50	340.00	2,362.00	97	13,512.54	6,756.27	5	684.21	513.75	9	1,303.52
Wyoming	55	159	7,434.85	25,392.29	1,858.74	25,398.68	137	23,272.08	11,636.04	36	6,682.43	5,092.82	10	2,478.69
Total	1,178	1,096	184,654.15	173,629.32	46,183.53	173,843.65	2,049	357,443.52	178,721.76	481	81,148.03	61,421.68	84	16,351.95

Entries made and expenses incurred at district land offices during fiscal year ended June 30, 1917—Continued.

RECAPITULATION, BY CLASSES, OF ENTRIES—Continued.

State.	Homestead entries.									State selections.			Railroad selections.		
	Entries.			Acres.			Amount.								
	Original.	Final.	Commuted.	Original.	Final.	Commuted.	Original.	Final.	Commuted.	No.	Acres.	Amount.	No.	Acres.	Amount.
Alabama	193	311	18	14,215.51	25,898.26	1,458.87	$1,544.60	$654.10	$1,823.76	1	40.03	$2.00	....	.....	.....
Alaska	159	16	.....	31,201.40	2,437.33	.....	2,706.69	141.55	.....	.....	.....	.....	.....	.....	.....
Arizona	1,033	838	68	175,225.95	142,239.97	9,604.33	16,531.40	5,728.72	11,935.69	1,073	1,208,120.12	7,784.00	7	14,141.60	$187.95
Arkansas	1,813	1,375	54	160,645.85	126,029.48	4,010.46	16,467.64	3,165.56	5,013.10	.....	.....	.....	.....	.....	.....
California	3,482	1,586	179	592,103.74	203,213.21	23,717.88	60,226.30	10,426.26	35,105.33	18	6,682.24	100.00	5	4,212.82	58.00
Colorado	7,864	4,658	84	1,812,332.84	1,037,352.18	11,643.85	145,504.23	43,084.01	14,733.44	4	1,765.55	24.00	....	.....	.....
Florida	472	507	70	43,296.39	59,860.85	7,281.39	4,409.85	1,493.12	9,092.90	3	328.39	6.00	....	.....	.....
Idaho	3,029	3,561	186	573,979.93	538,486.60	24,782.79	49,290.20	20,835.54	30,963.76	61	29,502.08	390.00	30	113,615.02	1,454.00
Kansas	674	355	21	114,652.58	53,740.35	2,798.02	9,852.75	1,707.79	4,047.53	.....	.....	.....	.....	.....	.....
Louisiana	233	139	25	16,385.63	9,691.60	1,631.76	1,902.41	298.49	2,119.42	1	159.52	2.00	....	.....	.....
Michigan	113	80	10	9,570.89	7,715.49	483.56	955.94	203.19	555.45	.....	.....	.....	.....	.....	.....
Minnesota	229	424	41	16,608.08	41,286.73	2,388.47	1,961.02	1,276.46	3,257.41	.....	.....	.....	4	161.85	8.00
Mississippi	209	206	18	15,205.05	15,020.14	1,056.31	1,657.42	395.15	1,370.34	.....	.....	.....	.....	.....	.....
Missouri	18	61	.....	1,324.89	4,370.63	.....	147.12	122.95	.....	.....	.....	.....	.....	.....	.....
Montana	15,197	14,542	349	3,471,286.50	3,131,982.92	48,723.49	297,537.85	146,547.97	63,590.27	72	34,695.23	474.00	78	121,710.51	1,604.00
Nebraska	562	1,700	30	109,790.84	788,086.53	3,459.67	7,036.29	6,678.84	4,524.56	.....	.....	.....	.....	.....	.....
Nevada	348	336	11	56,974.73	34,890.17	1,618.61	5,727.11	2,702.61	2,273.26	1	76.81	2.00	2	18,587.17	234.00
New Mexico	6,409	2,709	37	1,404,277.80	557,547.52	5,364.40	113,304.59	21,366.24	6,700.70	671	263,513.75	1,785.00	26	155,575.24	1,978.00
North Dakota	2,038	2,338	10	264,827.77	324,037.60	741.81	25,637.79	11,040.55	958.00	7	2,425.44	32.00	1	14.45	2.00
Oklahoma	554	335	67	56,268.90	43,008.28	7,741.22	5,514.86	1,074.72	9,461.65	.....	.....	.....	.....	.....	.....
Oregon	2,039	2,132	65	398,599.88	363,595.95	8,031.37	33,162.99	14,277.51	11,189.70	1	80.00	2.00	21	2,919.89	62.00
South Dakota	4,855	1,961	85	882,788.88	278,233.87	11,858.84	67,627.03	6,994.41	7,436.56	6	3,766.40	48.00	....	.....	.....
Utah	1,108	632	6	267,333.99	155,328.38	751.21	21,314.23	6,280.97	938.90	32	14,363.02	202.00	1	624.83	8.00
Washington	856	926	29	122,689.62	124,771.54	3,420.98	13,655.05	6,518.03	4,649.26	124	75,529.30	964.00	48	59,926.40	798.00
Wisconsin	77	111	9	4,026.53	9,138.83	448.75	541.91	363.28	801.42	.....	.....	.....	.....	.....	.....
Wyoming	5,332	1,888	22	1,404,912.94	419,425.27	2,800.79	106,782.27	17,216.79	3,725.24	13	1,360.25	30.00	9	16,469.43	216.00
Made at General Land Office	.....	1	.....	.....	40.00	.....	.....	.....	.....	.....	.....	[1]22,810.40	....	.....	.....
Commissions on Indian lands	.....	.....	.....	.....	.....	.....	87,119.96	11,663.11	.....	.....	.....	.....	....	.....	.....
Total	58,896	43,728	1,494	12,020,527.11	8,497,429.68	185,818.83	1,098,119.50	342,257.92	236,267.65	2,088	1,642,408.13	34,657.40	232	507,959.21	6,609.95

State.	Applications.						Mineral adverse claims.		Filings.								Fees.		Miscellaneous entries, applications, sales, etc.		
	Coal lands.		Timber and stone lands.		Mineral lands.				Preemption.		Homesteads.		Coal land.		Reservoir.		Cancellations.	Received for reducing testimony to writing, etc.			
	No.	Fees.	No.	Fees.	No.	Fees.	No.	Fees.	No.	Fees.	No.	Fees.	No.	Fees.	No.	Fees.			No.	Acres.	Amount.
Alabama			40	$400													$13	$889.23	1	146.77	
Alaska					40	$400	3	$30										409.85	906	1,573.65	$84,031.79
Arizona			4	40	72	720	7	70			1	$3			14	$42	51	1,719.43	32	2,280.00	678.00
Arkansas			34	340	4	40					2	4					42	3,549.32	3	307.61	384.52
California	1	$10	133	1,330	106	1,060	7	70			10	30	1	$3			237	7,142.69	117	1,927.86	12,379.56
Colorado	2	20	111	1,110	92	920	4	40	162	$486	36	108	24	72	9	27	611	12,879.04	2	160.00	100.00
Florida			4	40	1	10					1	2					27	1,950.91	2	50.60	101.00
Idaho			70	700	32	320	1	10			4	12					157	7,568.27	37	1,320.44	14,916.96
Kansas											14	28					80	745.00	2	160.00	408.00
Louisiana			9	90													13	2,020.90	4	701.42	456.65
Michigan			20	200							1	2					1	737.93			
Minnesota			40	400							1	2					89	2,609.73	2		331.90
Mississippi			31	310													26	1,686.03	3	385.64	
Missouri																	1	342.55	39	1,972.62	2,565.90
Montana	242	2,420	139	1,390	133	1,330	8	80	2	6	35	105	51	153	9	27	876	28,695.90	83	5,242.40	1,962.40
Nebraska			1	10	1	10					3	6					48	5,558.98			
Nevada					39	390	5	50			2	6	15	45			13	896.64	24	5,640.00	627.53
New Mexico					74	740					3	9	23	69	54	162	353	5,312.37	19	4,216.51	5,295.00
North Dakota	5	50															139	3,872.56	1	160.00	
Oklahoma																	65	1,711.09			687.74
Oregon	8	80	115	1,150	7	70					8	24	1	3			178	5,982.55	7	450.88	221.25
South Dakota	1	10	10	100	3	30	1	10			12	24	3	6	1	2	639	6,339.24	9		2,407.68
Utah	11	110	6	60	32	320	5	50			1	3	31	93	5	15	63	2,239.18	3	479.75	831.50
Washington			65	650	15	150					45	135	3	9			87	3,342.19	120	848.80	1,772.50
Wisconsin			2	20													9	559.29	1	240.00	
Wyoming	10	100	173	1,730	5	50					37	111	34	102	11	33	214	4,745.68	184	4,516.73	14,986.62
Made at General Land Office																			2	280.47	351.59
Commissions on Indian lands																					28,682.34
Total	280	2,800	1,007	10,070	656	6,560	41	410	164	492	216	614	186	555	103	308	4,032	113,506.55	1,603	33,062.15	174,180.43

[1] This is a payment by the State of California for excess area embraced in its State selections.

Statement showing the area of land unappropriated and unreserved on July 1, 1917.

[Counties containing no unappropriated lands are omitted.]

ALABAMA.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Montgomery:				
Autauga	80		80	Broken, rolling.
Baldwin	320		320	Level, sandy.
Barbour	160		160	Rolling, farm lands.
Butler	80		80	Pine, rolling.
Calhoun	200		200	Mountainous, broken.
Cherokee	2,400		2,400	Broken, hilly.
Chilton	160		160	Pine, rolling.
Choctaw	1,000		1,000	Do.
Clark	400		400	Hilly, broken, pine.
Clay	2,100		2,100	Do.
Cleburne	2,520		2,520	Broken, pine.
Colbert	80		80	Level, sandy.
Conecuh	360		360	Rolling, sandy.
Coosa	320		320	Level, pine, sandy.
Covington	280		280	Do.
Crenshaw	80		80	Do.
Dale	440		440	Do.
DeKalb	160		160	Broken, rolling.
Escambia	320		320	Do.
Etowah	400		400	Broken, hilly.
Fayette	280		280	Do.
Franklin	640		640	Pine, level.
Geneva	80		80	Do.
Green	120		120	Pine, sandy, rolling.
Houston	80		80	Level, pine.
Jackson	2,800		2,800	Pine, hilly.
Lamar	800		800	Pine, rolling.
Lauderdale	2,800		2,800	Hilly, broken, rolling.
Marion	1,880		1,880	Do.
Madison	6,000		6,000	Mountainous, hilly, broken.
Marshall	580		580	Broken, hilly.
Mobile	320		320	Broken, pine.
Monroe	240		240	Do.
Morgan	1,000		1,000	Broken, hilly.
Perry	40		40	Pine, rolling.
Pickens	360		360	Broken, pine, rolling.
Pike	200		200	Pine, level, sandy.
St. Clair	160		160	Hilly, broken, rolling.
Shelby	280		280	Do.
Sumter	80		80	Pine, rolling.
Talladega	720		720	Pine, hilly, broken.
Tuscaloosa	1,000		1,000	Do.
Washington	800		800	Pine, sandy, rolling.
State total	33,120		33,120	

ARIZONA.

Phoenix:				
Apache	676,190		676,190	Mountainous, arid, grazing, timber.
Cochise	554,370	406,900	961,270	Mountainous, grazing.
Coconino	135,700	395,280	530,980	Mountainous, grazing, timber.
Gila	45,000	100,000	145,000	Arid, broken.
Graham	421,560	631,060	1,052,620	Mountainous, grazing, arid.
Greenlee	119,420	263,080	382,500	Do.
Maricopa	859,330	2,276,440	3,135,770	Arid, grazing, broken.
Mohave	410,430	3,940,000	4,350,430	Do.
Navajo	398,860	133,750	532,610	Do.
Pima	795,880	1,373,080	2,168,960	Mountainous, arid, grazing.
Pinal	500,080	1,214,360	1,714,440	Arid, grazing.
Santa Cruz	74,420	46,080	120,500	Mountainous, arid, grazing.
Yavapai	635,350	1,314,450	1,949,800	Mountainous, timber, grazing.
Yuma	775,680	3,812,350	4,588,030	Arid, grazing, broken.
State total	6,402,270	15,906,830	22,309,100	

Statement showing the area of land unappropriated and unreserved on July 1, 1917—Con.

ARKANSAS.

Land district and county	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Camden:				
Ashley	83		83	Rolling, second rate soil.
Bradley	47		47	Swampy.
Calhoun	240		240	Do.
Clark	80		80	Broken.
Cleveland	54		54	River, creek bottom land.
Columbia	29		29	Rolling.
Drew	42		42	Do.
Garland	6,531		6,531	Mountainous.
Hempstead	2		2	River land.
Hot Spring	1,959		1,959	Mountainous.
Howard	2,644		2,644	Do.
Lafayette	44		44	Low, level land.
Little River	12		12	River land.
Miller	99		99	Low, wet.
Montgomery	14,856		14,856	Hilly, mountainous.
Nevada	84		84	Rolling.
Ouachita	5	40	45	River land.
Pike	3,073		3,073	Mountainous.
Polk	10,731		10,731	Do.
Saline	524		524	Do.
Sevier	1,066		1,066	Do.
Union	133		133	Flat, swampy.
Total	42,338	40	42,378	
Harrison:				
Baxter	16,547		16,547	Mountainous, timbered, mineral.
Benton	1,216		1,216	Mountainous, timbered.
Boone	2,698		2,698	Mountainous, timbered, mineral.
Carroll	2,356		2,356	Mountainous, timbered.
Crawford	280		280	Do.
Franklin	1,480		1,480	Do.
Fulton	10,080		10,080	Do.
Independence	520		520	Do.
Izard	12,651		12,651	Do.
Johnson	520		520	Do.
Madison	6,385		6,385	Do.
Marion	8,124		8,124	Mountainous, timbered, mineral.
Newton	12,498		12,498	Do
Searcy	12,122		12,122	Mountainous, timbered.
Stone	21,201		21,201	Do.
Van Buren	880		880	Do.
Washington	6,726		6,726	Do.
Total	116,284		116,284	
Little Rock:				
Arkansas	3		3	Level.
Cleburne	10,240		10,240	Mountainous, timbered.
Cleveland	35		35	Broken, timbered.
Conway	1,900		1,900	Mountainous, timbered.
Crawford	4,520		4,520	Do.
Dallas	40		40	Swampy.
Desha	80		80	Swampy, timbered.
Faulkner	680		680	Broken, timbered.
Franklin	5,080		5,080	Broken, mountainous, timbered.
Fulton	3,880		3,880	Broken, timbered.
Garland	3,800		3,800	Broken, mountainous, timbered.
Hot Spring	80		80	Broken, timbered.
Independence	3,560		3,560	Do.
Izard	3,520		3,520	Do.
Jackson	40		40	Do.
Johnson	14,480		14,480	Broken, mountainous, timbered.
Lawrence	541		541	Broken, timbered.
Lincoln	80		80	Do.
Logan	6,280		6,280	Do.
Mississippi	1,009		1,009	Swampy, timbered.
Montgomery	240		240	Broken, timbered.
Perry	680		680	Do.
Phillips	40		40	Do.
Pope	6,760		6,760	Do.
Pulaski	120		120	Do.
Randolph	3,720		3,720	Do.
Saline	970		970	Do.
Scott	21,000		21,000	Broken, mountainous, timbered.

Statement showing the area of land unappropriated and unreserved on July 1, 1917—Con.

ARKANSAS—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Little Rock—Continued.				
Sebastian	2,720		2,720	Broken, mountainous, timbered.
Sharp	9,160		9,160	Do.
Van Buren	47,480		47,480	Do.
White	400		400	Broken, timbered.
Woodruff	80		80	Do.
Yell	4,720		4,720	Do.
Total	157,938		157,938	
State total	316,560	40	316,600	

CALIFORNIA.

El Centro:				
Imperial	693,983	197,701	891,684	Rolling, level, desert.
Riverside	991,774	831,698	1,823,472	Mountainous, level, desert.
San Diego	346,443	62,080	408,523	Mountainous, rolling, desert.
Total	2,032,200	1,091,479	3,123,679	
Eureka:				
Del Norte	716		716	Sea beach, mountainous.
Humboldt	64,430	17,464	81,894	Mountainous, farming, grazing.
Medocino	6,370		6,370	Mountainous, grazing, timber.
Siskiyou	1,489		1,489	Farming, forest listings.
Trinity	28,050	2,560	30,610	Mountainous, grazing, timber, farming.
Total	101,055	20,024	121,079	
Independence:				
Alpine	10,581		10,581	Mountainous, grazing, mineral.
Inyo	2,676,535	1,154,718	3,831,253	Mountainous, agricultural, desert.
Kern	598,092	98,041	696,133	Grazing, mineral, agricultural.
Mono	288,507	29,284	317,791	Mountainous, grazing, agricultural, mineral.
San Bernardino	2,063,616	1,284,445	3,348,061	Mountainous, mineral, arid, desert.
Total	5,637,331	2,566,488	8,203,819	
Los Angeles:				
Kern	33,202	5,393	38,595	Arid, level desert, mountainous.
Los Angeles	500,100	8,770	508,870	Do.
Orange	19,726	1,624	21,350	Mountainous, hilly.
Riverside	197,250	45,599	242,849	Mountainous, rolling, level desert.
Santa Barbara	1,180		1,180	Mountainous, rolling.
San Bernardino	3,206,120	409,726	3,615,846	Mountainous, rolling, level desert.
San Diego	100,400	2,240	102,640	Mountainous, rolling.
Ventura	38,743	9,410	48,153	Do.
Total	4,096,721	482,762	4,579,483	
Sacramento:				
Alpine	17,600		17,600	Mountainous.
Amador	11,910		11,910	Hilly, grazing, mineral.
Butte	21,101		21,101	Do.
Calaveras	51,152		51,152	Do.
Colusa	31,710	1,280	32,990	Do.
El Dorado	37,303		37,303	Do.
Fresno	3,393	2,560	5,953	Do.
Glenn	11,911		11,911	Do.
Lake	9,880		9,880	Mountainous.
Madera	3,819		3,819	Hilly, grazing, farming, mineral.
Mariposa	40,366		40,366	Do.
Merced	4,496		4,496	Do.
Modoc	506	6,080	6,586	Mountainous, grazing, timber.
Napa	14,200		14,200	Do.
Nevada	40,288		40,288	Mineral, hilly, grazing.
Placer	23,049		23,049	Do.
Stanislaus	7,717		7,717	Do.
Shasta	175,283	2,160	177,443	Farming, grazing, timber, mineral.
Siskiyou	132,411	38,111	170,522	Do.
Tuolumne	28,136	1,600	29,736	Mineral, grazing, timber.

Statement showing the area of land unappropriated and unreserved on July 1, 1917—Con.

CALIFORNIA—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Sacramento—Continued.				
Tehama	72,284	720	73,004	Hilly, grazing, mineral.
Trinity	27,380	4,960	32,340	Mountainous, grazing, timber, mineral.
Yolo	35,350	.....	35,350	Hilly, grazing.
Yuba	25,457	.....	25,457	Hilly, grazing, mineral.
Total	826,702	57,471	884,173	
San Francisco:				
Alameda	1,059	1,280	2,339	Mountainous.
Colusa	12,119	.....	12,119	Do.
Contra Costa	1,280	.....	1,280	Do.
Fresno	60,416	3,440	63,856	Do.
Glenn	1,920	.....	1,920	Do.
Kern	22,527	640	23,167	Do.
Kings	1,088	.....	1,088	Do.
Lake	152,420	2,560	154,980	Do.
Merced	4,557	.....	4,557	Do.
Mendocino	184,141	2,960	187,101	Do.
Monterey	189,332	2,560	191,892	Do.
Napa	42,908	.....	42,908	Do.
San Benito	171,332	7,640	178,972	Do.
San Joaquin	1,501	.....	1,501	Do.
San Luis Obispo	180,790	2,712	183,502	Do.
Santa Barbara	16,774	.....	16,774	Do.
Santa Clara	55,903	3,660	59,563	Do.
Solano	1,980	.....	1,980	Do.
Sonoma	46,211	4,640	50,851	Do.
Stanislaus	19,211	2,600	21,811	Do.
Ventura	5,803	.....	5,803	Do.
Yolo	6,400	640	7,040	Do.
Total	1,179,672	35,332	1,215,004	
Susanville:				
Lassen	733,135	32,560	765,695	Timber, desert, grazing, mineral.
Modoc	193,240	16,840	210,080	Timber, desert, grazing, farming.
Plumas	8,120	3,877	11,997	Mountainous, timber, mineral.
Sierra	18,480	.....	18,480	Do.
Total	952,975	53,277	1,006,252	
Visalia:				
Fresno	138,604	2,814	141,418	Mountainous, grazing.
Kern	67,268	26,724	93,992	Do.
Kings	17,800	.....	17,800	Do.
Merced	8,361	.....	8,361	Do.
Monterey	1,767	.....	1,767	Do.
San Benito	8,426	.....	8,426	Do.
Tulare	34,196	65,768	99,964	Do.
Total	276,422	95,306	371,728	
State total	15,103,078	4,402,139	19,505,217	

COLORADO.

Del Norte:				
Alamosa	22,175	3,840	26,015	Grazing.
Chaffee	2,269	.....	2,269	Do.
Conejos	144,640	.....	144,640	Do.
Fremont	1,508	.....	1,508	Do.
Huerfano	5,929	3,840	9,769	Mostly grazing, probably some timber.
Las Animas	.....	29,440	29,440	Do.
Rio Grande	55,660	.....	55,660	Grazing.
Saguache	297,576	.....	297,576	Do.
Total	529,757	37,120	566,877	
Denver:				
Adams	120	.....	120	Agricultural, grazing.
Arapahoe	160	.....	160	Do.
Boulder	720	.....	720	Mountainous, mineral.
Clear Creek	6,740	13,440	20,180	Do.

Statement showing the area of land unappropriated and unreserved on July 1, 1917—Con.

COLORADO—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Denver—Continued.				
Douglas	2,620		2,620	Arid, grazing, broken.
Eagle	20,240		20,240	Mountainous, grazing, mineral.
Elbert	720		720	Agricultural, grazing.
Gilpin	8,120	3,840	11,960	Mountainous, grazing, mineral.
Grand	110,100	13,860	123,960	Mountainous, grazing.
Jackson	226,440		226,440	Do.
Jefferson	10,060		10,060	Do.
Larimer	52,720		52,720	Do.
Morgan	520		520	Agricultural, grazing.
Routt		7,680	7,680	Mountainous, grazing, mineral.
Summit	5,420	4,630	10,050	Do.
Weld	1,880		1,880	Agricultural, grazing.
Total	446,580	43,450	490,030	
Durango:				
Archuleta	80,382		80,382	Agricultural, timber, grazing.
Dolores	7,017	96,790	103,807	Mountainous, agricultural, mineral.
La Plata	104,578		104,578	Grazing, agricultural, mineral.
Montezuma	59,913	43,356	103,269	Do.
Total	251,890	140,146	392,036	
Glenwood Springs:				
Eagle	29,671	201,080	230,751	Farming, grazing, mineral.
Garfield	647,760	143,280	791,040	Do.
Gunnison	8,553	4,800	13,353	Do.
Mesa	133,525	15,360	148,885	Do.
Moffat	1,426,562	311,600	1,738,162	Do.
Pitkin	25,944	25,400	51,344	Grazing, mineral.
Rio Blanco	1,184,362	158,880	1,343,242	Farming, grazing.
Routt	144,363	77,196	221,559	Farming, grazing, mineral.
Total	3,600,740	937,596	4,538,336	
Hugo:				
Cheyenne	800		800	Prairie, farming, grazing.
Kit Carson	5,553		5,553	Do.
Lincoln	1,800		1,800	Do.
Total	8,153		8,153	
Lamar:				
Baca	58,198		58,198	Farming, prairie, hilly, grazing.
Bent	59,884		59,884	Broken, hilly, prairie, grazing.
Cheyenne	885		885	Prairie, grazing.
Kiowa	4,473		4,473	Rolling, prairie, grazing.
Las Animas	89,085		89,085	Broken, hilly, grazing.
Lincoln	195		195	Prairie, grazing.
Prowers	17,061		17,061	Prairie, hilly, grazing.
Total	229,781		229,781	
Leadville:				
Chaffee	72,298		72,298	Mountainous, mineral, grazing, agricultural.
Fremont	37,481		37,481	Grazing, agricultural, mineral.
Lake	8,444		8,444	Grazing, mountainous, mineral.
Park	266,183	10,844	277,027	Grazing, agricultural, mineral.
Summit	465		465	Grazing, mountainous, mineral.
Teller	5,920	2,800	8,720	Grazing, agricultural.
Total	390,791	13,644	404,435	
Montrose:				
Delta	195,002	55,560	250,562	Mountainous, coal, grazing.
Dolores	31,680	19,200	50,880	Mineral, grazing, arid.
Gunnison	488,560	78,880	567,440	Mountainous, coal, mineral, farming, grazing.
Hinsdale	104,600	11,200	115,800	Mountainous, mineral, timber, coal, grazing.
Mesa	554,649	267,040	821,689	Coal, farming, mineral, grazing.
Montrose	513,053	157,200	670,253	Do.
Ouray	29,440		29,440	Agricultural, grazing, mineral, mountainous.

Statement showing the area of land unappropriated and unreserved on July 1, 1917—Con.

COLORADO—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Montrose—Continued.				
Saguache	130,560		130,560	Farming, grazing, mineral, timber.
San Miguel	249,002	92,800	341,802	Agricultural, rich mineral, grazing, coal.
Total	2,296,546	681,880	2,978,426	
Pueblo:				
Bent	2,240		2,240	Agricultural, grazing.
Costilla	8,280		8,280	Mountainous.
Crowley	2,400	6,840	9,240	Agricultural, grazing.
Custer	38,280		38,280	Mountainous, grazing.
Elbert	560		560	Agricultural, grazing.
El Paso	2,120	3,010	5,130	Mountainous, agricultural, grazing.
Fremont	325,920		325,920	Do.
Huerfano	62,580	10,040	72,620	Do.
Kiowa	280		280	Grazing, agricultural.
Las Animas	183,708		183,708	Mountainous, agricultural, grazing.
Lincoln	3,960		3,960	Grazing, agricultural.
Otero	13,780		13,780	Do.
Pueblo	20,860		20,860	Agricultural, mountainous, grazing.
Saguache	21,140		21,140	Mountainous.
Teller	25,280		25,280	Mountainous, largely mineral.
Total	711,388	19,890	731,278	
Sterling:				
Logan	1,613	3,640	5,253	Sandy, grazing.
Morgan	2,080		2,080	Do.
Phillips	1,252		1,252	Do.
Sedgwick	199		199	Do.
Washington	520	50,802	51,322	Grazing, agricultural.
Weld	2,259	7,135	9,394	Do.
Yuma	6,385	1,080	7,465	Sandy, grazing.
Total	14,308	62,657	76,965	
State total	8,479,934	1,936,383	10,416,317	

FLORIDA.

Gainesville:				
Alachua	1,933		1,933	Low, pine.
Bay	3,974		3,974	Do.
Baker	634		634	Do.
Bradford	786		786	Do.
Brevard	16,055		16,055	Low, pine, swamp.
Calhoun	1,120		1,120	Low, pine.
Citrus	3,752		3,752	Do.
Clay	1,331		1,331	Do.
Columbia	652		652	Do.
De Soto	6,131		6,131	Do.
Escambia	815		815	Do.
Gadsden	503		503	Do.
Hamilton	753		753	Do.
Hernando	840		840	Do.
Holmes	407		407	Do.
Jackson	107		107	Do.
Jefferson	10		10	Do.
Lafayette	5,948		5,948	Low, pine, swamp.
Lake	17,297		17,297	Low, pine.
Lee	9,868		9,868	Low, pine, swamp.
Leon	80		80	Low, pine.
Levy	4,310		4,310	Do.
Liberty	724		724	Do.
Madison	720		720	Do.
Manatee	1,073		1,073	Do.
Marion	7,133		7,133	Do.
Monroe	1,062		1,062	Low, pine, swamp.
Nassau	306		306	Low, pine.
Osceola	396		396	Do.
Okaloosa	480		480	Do.
Orange	1,730		1,730	Do.

Statement showing the area of land unappropriated and unreserved on July 1, 1917—Con.

FLORIDA—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Gainesville—Continued.				
Pasco	560		560	Low, pine.
Polk	1,198		1,198	Do.
Putnam	5,733		5,733	Do.
St. John	867		867	Do.
St. Lucie	681		681	Low, pine, swamp.
Santa Rosa	139		139	Low, pine.
Seminole	493		493	Do.
Suwanee	495		495	Do.
Taylor	2,800		2,800	Do.
Volusia	8,300		8,300	Do.
Wakulla	520		520	Do.
Walton	5,125		5,125	Do.
Washington	1,623		1,623	Do.
State total	119,464		119,464	

IDAHO.

Blackfoot:				
Bannock	121,700	42,240	163,940	Mountainous.
Bear Lake	47,400	25,260	72,660	Rough, broken.
Bingham	306,564	163,200	469,764	Rolling, lava, hilly.
Bonneville	19,780	63,550	83,330	Rolling, agricultural, grazing.
Franklin	1,800	1,280	3,080	Rough, grazing.
Fremont	219,760	227,420	447,180	Rolling, agricultural.
Jefferson	238,320	261,440	499,760	Do.
Lemhi		1,920	1,920	Mountainous.
Madison	1,640	3,840	5,480	Rolling, hills.
Oneida	76,000	75,080	151,080	Rough, grazing.
Power	72,684	12,640	85,324	Do.
Teton	4,160		4,160	Mountainous.
Total	1,109,808	877,870	1,987,678	
Boise:				
Ada	159,116		159,116	Arid, mountainous.
Adams	53,150		53,150	Mountainous, grazing, timber.
Boise	116,330	7,680	124,010	Mountainous, timbered, grazing, mineral.
Canyon	23,305		23,305	Arid, grazing.
Elmore	359,281	32,000	391,281	Arid, mineral, mountainous.
Gem	57,291	14,080	71,371	Arid, mountainous, grazing, timbered.
Idaho	46,210	142,850	189,060	Arid, mountainous, grazing, mineral.
Owyhee	1,958,337	1,731,940	3,690,277	Do.
Payette	59,642		59,642	Arid, mountainous, grazing.
Valley	38,437	541,000	579,437	Arid, mountainous, grazing, mineral, timber.
Washington	170,240	26,880	197,120	Arid, mountainous, timbered, mineral.
Total	3,041,339	2,496,430	5,537,769	
Coeur d'Alene:				
Benewah	12,844		12,844	Agricultural, grazing, timbered.
Bonner	18,698		18,698	Agricultural, grazing, timbered, mineral.
Boundary	4,301	560	4,861	Do.
Kootenai	21,350		21,350	Agricultural, grazing, timbered.
Shoshone	67,297	12,800	80,097	Agricultural, grazing, timbered, mineral.
Total	124,490	13,360	137,850	
Hailey:				
Bingham	20,748	27,268	48,016	Lava, sagebrush plains.
Blaine	807,975	978,586	1,786,561	Mountainous grazing sagebrush.
Cassia	334,167	14,087	348,254	Grazing, sagebrush, somewhat mountainous.
Custer	603,214	380,040	983,254	Grazing, sagebrush, mountainous.
Elmore	138,862	33,198	172,060	Do.
Fremont	43,575	33,880	77,455	Lava, sage brush plains.
Gooding	141,694	22,900	164,594	Do.

Statement showing the area of land unappropriated and unreserved on July 1, 1917—Con.

IDAHO—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Hailey—Continued.				
Idaho	21,948	654,400	676,348	Mountainous, grazing, sagebrush.
Lemhi	513,494	119,491	632,985	Do.
Lincoln	315,118	281,696	596,814	Lava, sagebrush plains.
Minidoka	146,539	167,477	314,016	Do.
Owyhee	178,793	132,200	310,993	Grazing, sagebrush plains.
Power	72,486	41,489	113,975	Lava, sagebrush plains.
Twin Falls	254,335	57,229	311,564	Grazing, sagebrush plains.
Total	3,592,918	2,943,941	6,536,889	
Lewiston:				
Clearwater	26,908	.....	26,908	Mountainous.
Idaho	51,004	3,600	54,604	Mountainous, grazing.
Latah	1,377	.....	1,377	Mountainous.
Lewis	6,062	.....	6,062	Mountainous, grazing.
Nez Perce	13,769	10,680	24,449	Do.
Shoshone	2,522	.....	2,522	Mountainous.
Total	101,642	14,280	115,922	
State total	7,970,227	6,345,881	14,316,108	

KANSAS.

Dodge City:				
Barber	188	.....	188	Broken, sandy.
Clark	829	.....	829	Do.
Comanche	200	.....	200	Do.
Edwards	225	.....	225	Do.
Finney	36	.....	36	Do.
Greeley	181	.....	181	Agricultural.
Hamilton	1,880	.....	1,880	Broken, sandy.
Kearny	390	.....	390	Do.
Kiowa	70	.....	70	Do.
Lane	440	.....	440	Grazing, broken.
Meade	257	.....	257	Broken, sandy.
Morton	478	.....	478	Do.
Ness	120	.....	120	Do.
Seward	398	.....	398	Do.
Scott	520	.....	520	Grazing, broken.
Stafford	41	.....	41	Swampy.
Stanton	90	.....	90	Grazing, broken.
Stevens	656	.....	656	Broken, sandy.
Wichita	160	.....	160	Grazing, broken.
Total	7,159	.....	7,159	
Topeka:				
Cheyenne	1,360	.....	1,360	Rough, broken.
Ellis	84	.....	84	Do.
Gove	280	.....	280	Do.
Logan	120	.....	120	Do.
Rawlins	360	.....	360	Do.
Total	2,204	.....	2,204	
State total	9,363	.....	9,363	

LOUISIANA.

Baton Rouge:				
Acadia	9	.....	9	Prairie.
Allen	159	.....	159	Pine woods.
Ascension	503	.....	503	Swampy.
Avoyelles	762	.....	762	Prairie, pine woods.
Beauregard	79	.....	79	Pine woods.
Bienville	450	.....	450	High, pine woods.

Statement showing the area of land unappropriated and unreserved on July 1, 1917—Con.

LOUISIANA—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Baton Rouge—Continued.				
Bossier	2,204		2,204	High, pine woods.
Caddo	1,207		1,207	Do.
Calcasieu	1,798		1,798	Prairie, pine woods.
Caldwell	5,848		5,848	High, pine woods.
Cameron	258		258	Prairie, marsh.
Catahoula	4,523		4,523	High, pine woods.
Claiborne	861		861	Pine woods.
Concordia	381		381	Alluvial.
De Soto	380		380	High, pine woods.
E. Baton Rouge	28		28	Pine.
East Carroll	456		456	Low, pine woods.
East Feliciana	16		16	Pine woods.
Evangeline	121		121	Prairie, pine.
Franklin	144		144	Pine woods, hilly.
Grant	140		140	Do.
Iberia	1,136		1,136	Prairie, marsh.
Jackson	80		80	Pine woods, hilly.
Lafourche	96		96	Agricultural.
La Salle	603		603	Pine woods.
Lincoln	481		481	Agricultural.
Livingston	112		112	Hardwoods.
Madison	237		237	Low, pine woods.
Morehouse	366		366	Pine woods.
Natchitoches	566		566	Do.
Ouachita	1,427		1,427	Do.
Plaquemines	1,729		1,729	Prairie, marsh.
Pointe Coupee	813		813	Ordinary farming, swampy.
Rapides	369		369	Pine woods, agricultural.
Red River	53		53	Do.
Richland	635		635	Do.
Sabine	433		433	Do.
St. Charles	160		160	Do.
St. Helena	63		63	Pine woods.
St. James	291		291	Farming, swampy
St. John	1,590		1,590	Do.
St. Landry	32		32	Prairie, pine woods.
St. Martin	740		740	Prairie, swampy.
St. Mary	759		759	Do.
St. Tammany	272		272	Pine woods.
Tangipahoa	117		117	Pine woods, swampy.
Tensas	296		296	Alluvial.
Terrebonne	3,256		3,256	Low, swampy.
Union	317		317	Pine woods, farming.
Vermilion	318		318	Prairie.
Vernon	317		317	Pine woods.
Washington	96		96	Pine woods, farming.
Webster	327		327	Pine woods.
West Feliciana	265		265	Pine woods, farming.
Winn	160		160	Do.
State total	38,839		38,839	

MICHIGAN.

Marquette:				
Alcona	876		876	Light soil.
Alger	2,213		2,213	Fair farming.
Alpena	240		240	Do.
Antrim	271		271	Do.
Baraga	4,880		4,880	Do.
Benzie	16		16	Do.
Charlevoix	1,588		1,588	Do.
Cheboygan	1,008		1,008	Do.
Chippewa	9,770		9,770	Timbered, farming.
Clare	515		515	Fair farming.
Crawford	1,660		1,660	Do.
Delta	5,233		5,233	Do.
Dickinson	1,440		1,440	Do.
Emmett	311		311	Do.
Gogebic	80		80	Do.
Grand Traverse	982		982	Do.
Houghton	80		80	Do.

Statement showing the area of land unappropriated and unreserved on July 1, 1917—Con.

MICHIGAN—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Marquette—Continued.				
Iosco	838		838	Light soil.
Jackson	65		65	Wet.
Kalkaska	2,140		2,140	Light soil.
Keweenaw	11,087		11,087	Do.
Lake	200		200	Very light soil.
Leelanau	2,238		2,238	Fair farming.
Livingston	240		240	Wet.
Luce	3,569		3,569	Fair farming, some timber.
Mackinac	1,883		1,883	Fair farming.
Manistee	120		120	Do.
Marquette	5,400		5,400	Do.
Menominee	880		880	Do.
Missaukee	447		447	Do.
Montmorency	2,320		2,320	Do.
Muskegon	273		273	Do.
Oceana	465		465	Very sandy.
Ogemaw	120		120	Sandy, light soil.
Ontonagon	340		340	Timbered, farming.
Osceola	80		80	Fair farming.
Oscoda	1,759		1,759	Light soil.
Otsego	1,110		1,110	Fair farming.
Presque Isle	1,480		1,480	Do.
Roscommon	480		480	Do.
Schoolcraft	11,622		11,622	Do.
State total	80,319		80,319	

MINNESOTA.

Cass Lake:				
Beltrami	151,180		151,180	Timbered, agricultural, swampy.
Cass	1,640		1,640	Timbered, agricultural, rough.
Hubbard	200		200	Timbered, agricultural, swampy.
Itasca	2,960		2,960	Do.
Koochiching	166,520		166,520	Do.
Total	322,500		322,500	
Crookston:				
Beltrami	177,136		177,136	Swamp, some timber.
Clearwater	2,671		2,671	Swamp, cut-over pine
Roseau	25,854		25,854	Swamp, some timber.
Total	205,661		205,661	
Duluth:				
Aitkin	440		440	Agricultural.
Cass	520		520	Do.
Carlton	240		240	Do.
Crow Wing	15		15	Frl. lots.
Cook	12,400		12,400	Agricultural.
Freeborn	40		40	Swampy.
Goodhue	40		40	Do.
Hubbard	40		40	Do.
Itasca	760		760	Agricultural.
Koochiching	16,320		16,320	Do.
Lake	4,800		4,800	Do.
Morrison	24		24	Frl. lots.
Otter Tail	16		16	Do.
Pine	200		200	Swampy.
Pope	40		40	Do.
St. Louis	23,320		23,320	Agricultural.
Wadena	80		80	Swampy.
Wabasha	80		80	Do.
Winona	40		40	Sandy.
Total	59,415		59,415	
State total	587,576		587,576	

Statement showing the area of land unappropriated and unreserved on July 1, 1917—Con.

MISSISSIPPI.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Jackson:				
Adams	1,056		1,056	Agricultural, timbered.
Amite	360		360	Do.
Attala	1,000		1,000	Agricultural.
Bolivar	602		602	Do.
Calhoun	160		160	Do.
Carroll	400		400	Do.
Choctaw	160		160	Agricultural, timbered.
Claiborne	625		625	Agricultural.
Clarke	705		705	Do.
Copiah	600		600	Do.
Covington	182		182	Do.
Forrest	400		400	Pine woods, farming.
Franklin	890		890	Agricultural, timbered.
George	818		818	Pine belt, level.
Greene	2,608		2,608	Agricultural, timbered.
Grenada	1,280		1,280	Do.
Hancock	766		766	Do.
Hinds	188		188	Do.
Holmes	40		40	Do.
Issaquena	140		140	Do.
Jackson	[1]4,229		4,229	Do.
Jasper	320		320	Do.
Jefferson	1,067		1,067	Farming, some unbroken.
Jefferson Davis	80		80	Agricultural.
Jones	323		323	Agricultural, timbered.
Kemper	200		200	Do.
Lauderdale	525		525	Pine belt.
Lawrence	120		120	Timbered, farming.
Leake	360		360	Agricultural, timbered.
Leflore	645		645	Hilly, farming.
Lincoln	160		160	Do.
Lowndes	320		320	Farming.
Marion	337		337	Level, farming, grazing.
Monroe	1,055		1,055	Agricultural, timbered.
Montgomery	800		800	Do.
Neshoba	40		40	Do.
Newton	1,440		1,440	Do.
Noxubee	280		280	Do.
Panola	80		80	Generally level, farming.
Pearl River	806		806	Level, pine woods.
Perry	641		641	Agricultural, timbered.
Pike	40		40	Do.
Quitman	87		87	Do.
Rankin	160		160	Do.
Scott	160		160	Do.
Smith	134		134	Generally level, farming.
Stone	80		80	Agricultural.
Sunflower	20		20	Level, agriculture.
Tallahatchie	80		80	Generally level, farming.
Washington	40		40	Agricultural, timbered.
Wayne	1,946		1,946	Do.
Webster	840		840	Do.
Wilkinson	614		614	Do.
Winston	200		200	Do.
Warren	305		305	Hilly.
Yalabousha	484		484	Swampy, farming.
Yazoo	40		40	Agricultural, timbered.
State total	32,038		32,038	

MISSOURI.

Springfield:				
Barry	78		78	Agricultural.
Butler	3		3	Do.
Carter	15		15	Do.
Camden	32		32	Do.
Jefferson	40		40	Do.
Madison	40		40	Do.
Shannon	8		8	Do.
St. Francois	40		40	Do.
Ste. Genevieve	18		18	Do.
State total	274		274	

[1] Including Horn Island.

Statement showing the area of land unappropriated and unreserved on July 1, 1917—Con.

MONTANA.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Billings:				
Big Horn	38,883	15,360	54,243	Mountainous, agricultural, grazing.
Carbon	100,020	149,366	249,386	Mountainous, grazing.
Musselshell	7,991	.....	7,991	Principally grazing.
Rosebud	52,634	.....	52,634	Agricultural, grazing.
Stillwater	2,648	.....	2,648	Principally grazing.
Yellowstone	13,620	.....	13,620	Do.
Total	215,796	164,726	380,522	
Bozeman:				
Beaverhead	14,540	17,026	31,566	Grazing land.
Broadwater	22,291	.....	22,291	Arid, grazing land.
Carbon	13,392	7,680	21,072	Grazing land.
Gallatin	1,240	.....	1,240	Grazing, mountainous land.
Jefferson	13,896	8,723	22,619	Do.
Madison	93,111	115,378	208,489	Do.
Park	10,286	10,155	20,441	Do.
Stillwater	18,479	.....	18,479	Grazing, arid, mountainous.
Sweet Grass	83,730	.....	83,730	Do.
Total	270,965	158,962	429,927	
Glasgow:				
Dawson	231,217	204,800	436,017	Agricultural, grazing.
Phillips	201,800	490,520	692,320	Do.
Richland	44,451	40,960	85,411	Do.
Sheridan	83,780	.....	83,780	Do.
Valley	192,055	532,480	724,535	Do.
Total	753,303	1,268,760	2,022,063	
Great Falls:				
Cascade	27,740	41,585	69,325	Grazing, broken, agricultural.
Chouteau	80,140	.....	80,140	Do.
Fergus	6,120	.....	6,120	Do.
Hill	9,254	.....	9,254	Do.
Lewis and Clark	12,211	.....	12,211	Mountainous, grazing, agricultural.
Teton	111,608	30,080	141,688	Do.
Toole	57,072	.....	57,072	Grazing, broken, agricultural.
Total	304,145	71,665	375,810	
Havre:				
Blaine	117,756	307,129	424,885	Mountainous, agricultural, grazing.
Chouteau	50,920	63,153	114,073	Do.
Hill	73,320	.....	73,320	Do.
Phillips	131,278	502,373	633,651	Do.
Toole	32,220	4,160	36,380	Do.
Total	405,494	876,815	1,282,309	
Helena:				
Beaverhead	530,964	542,340	1,073,304	Do.
Broadwater	156,899	7,040	163,939	Do.
Cascade	74,399	.....	74,399	Do.
Deer Lodge	72,106	.....	72,106	Do.
Gallatin	12,547	.....	12,547	Do.
Jefferson	306,959	12,800	319,759	Do.
Lewis and Clark	259,611	194,000	453,611	Do.
Madison	193,258	215,340	408,598	Do.
Meagher	282,339	32,080	314,419	Do.
Park	2,580	.....	2,580	Do.
Powell	106,569	34,420	140,989	Do.
Silver Bow	116,492	15,200	131,692	Do.
Sweet Grass	3,682	.....	3,682	Do.
Teton	32,018	.....	32,018	Do.
Total	2,150,423	1,053,220	3,203,643	
Kalispell:				
Flathead	78,500	.....	78,500	Mountainous, timber, some agricultural.
Lincoln	4,640	.....	4,640	Agricultural.
Sanders	35,980	.....	35,980	Mountainous, timber, some agricultural.
Teton	520	.....	520	Agricultural, grazing.
Total	119,640	.....	119,640	

Statement showing the area of land unappropriated and unreserved on July 1, 1917—Con.

MONTANA—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Lewistown:				
Chouteau	8,780		8,780	Broken, grazing.
Dawson	139,093	25,240	164,333	Farming, grazing, timber.
Fergus	238,795	181,880	420,675	Do.
Meagher	3,120	7,680	10,800	Farming, grazing.
Musselshell	9,923	19,280	29,203	Agricultural, grazing.
Rosebud	2,346		2,346	Farming, grazing, broken.
Sweet Grass	2,000		2,000	Farming, grazing.
Total	404,057	234,080	638,137	
Miles City:				
Big Horn	21,129	138,240	159,369	Grazing, agricultural.
Carter	220,925	628,846	849,771	Do.
Custer	412,172	380,160	792,332	Do.
Dawson	225,739	677,419	903,158	Do.
Fallon	18,641		18,641	Do.
Prairie	29,515		29,515	Do.
Richland	2,918		2,918	Do.
Rosebud	113,067	93,600	206,667	Do.
Wibaux	9,216		9,216	Do.
Total	1,053,322	1,918,265	2,971,587	
Missoula:				
Beaverhead	15,517	5,000	20,517	Arid, grazing.
Granite	41,373	93,180	134,553	Mountainous, timber, mineral.
Missoula	33,724	37,636	71,360	Do.
Mineral	57,795		57,795	Do.
Powell	40,631	25,880	66,511	Do.
Ravalli	2,049	388	2,437	Mountainous, timber, grazing.
Sanders	7,441	34,162	41,603	Mountainous, timber, mineral.
Total	198,530	196,246	394,776	
State total	5,875,675	5,942,739	11,818,414	

NEBRASKA.

Alliance:				
Arthur	360		360	Sand hills, grazing.
Banner	1,200		1,200	High tableland, hilly.
Box Butte	2,280		2,280	Broken, grazing, sandy.
Dawes	2,120		2,120	Very rough, grazing.
Garden	4,960		4,960	Sand hills, grazing.
Grant	400		400	Do.
Morrill	12,580		12,580	Agricultural, grazing.
Scotts Bluff	11,980		11,980	Mountainous, agricultural, grazing.
Sheridan	7,740		7,740	Prairie, sand hills, grazing.
Sioux	9,505		9,505	Very broken, rough, sandy.
Total	53,125		53,125	
Broken Bow:				
Arthur	1,642		1,642	Sandy, rolling, small valleys.
Blaine	2,409		2,409	Do.
Brown	1,881		1,881	Do.
Cherry	6,907		6,907	Do.
Custer	160		160	Do.
Grant	3,664		3,664	Do.
Hooker	7,327		7,327	Do.
Logan	1,201		1,201	Do.
McPherson	2,006		2,006	Do.
Thomas	4,595		4,595	Do.
Total	31,792		31,792	
Lincoln:				
Chase	387		387	Broken, sandy, grazing.
Dundy	397		397	Do.
Frontier	120		120	Do.
Hayes	600		600	Broken, grazing.
Hitchcock	400		400	Broken, sandy, grazing.
Red Willow	40		40	Broken, grazing.
Total	1,944		1,944	

Statement showing the area of land unappropriated and unreserved on July 1, 1917—Con.

NEBRASKA—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
North Platte:				
Arthur	1,042		1,042	Grazing land.
Banner	160		160	Do.
Deuel	26		26	Do.
Garden	1,429		1,429	Do.
Keith	281		281	Do.
Lincoln	1,006		1,006	Do.
Logan	160		160	Do.
McPherson	1,084		1,084	Do.
Morrill	202		202	Do.
Total	5,390		5,390	
O'Neill:				
Boyd	94		94	Sandy, grazing.
Brown	160		160	Do.
Dakota	288		288	River bottom.
Garfield	800		800	Sandy, grazing.
Holt	720		720	Do.
Knox	240		240	River bottom.
Loup	1,360		1,360	Sandy, grazing.
Rock	160		160	Do.
Washington	40		40	River bottom.
Wheeler	80		80	Sandy, grazing.
Total	3,942		3,942	
Valentine:				
Brown	2,308		2,308	Rough, sandy, grazing.
Cherry	29,755		29,755	Do.
Keyapaha	400		400	Do.
Rock	1,360		1,360	Do.
Total	33,823		33,823	
State total	130,016		130,016	

NEVADA.

Carson City:				
Churchill	1,294,343	1,344,547	2,638,890	Mountainous, arid, grazing, little timber.
Clark	3,167,668	1,171,388	4,339,056	Do.
Douglass	176,520	14,340	190,860	Do.
Esmeralda	1,085,695	906,528	1,992,223	Do.
Eureka	18,201	40,070	58,271	Mountainous, arid, grazing.
Humboldt	2,538,466	3,786,058	6,324,524	Do.
Lander	86,688	44,081	130,769	Do.
Lincoln	2,093,897	3,961,820	6,055,717	Do.
Lyon	343,000	229,188	572,188	Do.
Mineral	1,207,949	671,819	1,879,768	Mountainous, arid, little timber.
Nye	3,328,778	5,541,731	8,870,509	Mountainous, arid, grazing, little timber.
Ormsby	24,665	19,980	44,645	Mountainous, arid, grazing, second growth.
Storey	97,970	1,272	99,242	Mountainous, arid, grazing.
Washoe	2,118,634	786,822	2,905,456	Mountainous, arid, grazing, second growth.
White Pine		19,300	19,300	Mountainous, arid, grazing, little timber.
Total	17,582,474	18,538,944	36,121,418	
Elko:				
Churchill	127,430	7,000	134,430	Mountainous, arid, grazing, little timber.
Elko	6,192,503	896,856	7,089,359	Do.
Eureka	872,673	1,273,783	2,146,456	Mountainous, arid, grazing, no timber.
Humboldt	1,213,050	206,897	1,419,947	Do.
Lander	1,108,681	1,301,152	2,409,833	Do.
Lincoln	570,521	188,740	759,261	Mountainous, arid, grazing, little timber.

Statement showing the area of land unappropriated and unreserved on July 1, 1917—Con.

NEVADA—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Elko—Continued.				
Nye	404,865	170,187	575,052	Mountainous, arid, grazing, no timber.
White Pine	2,851,141	1,739,934	4,591,075	Mountainous, arid, grazing, little timber.
Total	13,340,864	5,784,549	19,125,413	
State total	30,923,338	24,323,493	55,246,831	

NEW MEXICO.

Clayton:				
Colfax	23,320	.....	23,320	Arid, broken, grazing.
Mora	13,200	.....	13,200	Mostly grazing, some broken.
Quay	4,000	.....	4,000	Grazing.
San Miguel	19,080	.....	19,080	Do.
Union	214,230	.....	214,230	Grazing, broken.
Total	273,830	.....	273,830	
Fort Sumner:				
Chaves	491,750	.....	491,750	Broken, grazing.
Curry	11,520	.....	11,520	Grazing.
Guadalupe	365,430	.....	365,430	Do.
Lincoln	424,162	.....	424,162	Do.
Roosevelt	92,880	.....	92,880	Broken, grazing.
Total	1,385,742	.....	1,385,742	
Las Cruces:				
Dona Ana	1,412,840	324,073	1,736,913	Grazing, mountainous.
Grant	535,447	599,676	1,135,123	Do.
Luna	825,276	226,055	1,051,331	Do.
Otero	1,057,520	470,597	1,528,117	Do.
Sierra	1,182,371	283,362	1,465,733	Do.
Socorro	2,042,022	1,153,353	3,195,375	Do.
Total	7,055,476	3,057,116	10,112,592	
Roswell:				
Chaves	702,230	445,640	1,147,870	Grazing, rolling prairie.
Eddy	747,740	554,860	1,302,600	Mostly prairie, timber in mountains.
Lea	231,050	81,920	312,970	Grazing, rolling prairie.
Lincoln	373,580	249,800	623,380	Grazing, timber in mountains.
Otero	118,400	593,080	711,480	Grazing.
Roosevelt	6,560	81,920	88,480	Do.
Socorro	.....	102,400	102,400	Undulating prairie.
Torrance	35,720	.....	35,720	Prairie, grazing.
Total	2,215,280	2,109,620	4,324,900	
Santa Fe:				
Bernalillo	25,680	21,700	47,380	Timber, grazing, agricultural.
Colfax	1,440	7,680	9,120	Mountainous, grazing, coal.
Guadalupe	82,220	3,200	85,420	Grazing, agricultural.
McKinley	454,012	114,000	568,012	Mountainous, timber, grazing, coal.
Mora	6,080	.....	6,080	Mountainous, grazing, agricultural, coal.
Rio Arriba	382,980	354,860	737,840	Do.
Sandoval	235,190	192,480	427,670	Do.
San Juan	812,690	177,920	990,610	Grazing, agricultural, coal.
San Miguel	32,050	90,680	122,730	Timber, grazing, agricultural.
Santa Fe	68,080	27,400	95,480	Mountainous, grazing, coal.
Socorro	531,160	17,940	549,100	Do.
Taos	164,880	181,400	346,280	Mountainous, timber, grazing, agricultural.
Torrance	130,740	49,120	179,860	Timber, grazing, agricultural, saline.
Valencia	681,110	11,520	692,630	Do.
Total	3,608,312	1,249,900	4,858,212	

Statement showing the area of land unappropriated and unreserved on July 1, 1917—Con.

NEW MEXICO—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Tucumcari:				
Curry	389		389	Very rough, broken.
Guadalupe	10,466		10,466	Broken, grazing, some agricultural.
Quay	48,687	5,360	54,047	Grazing, agricultural, mostly broken.
San Miguel	3,532	5,500	9,032	Broken, grazing, some agricultural.
Union	23,955	10,000	33,955	Rolling, sandy, grazing.
Total	87,029	20,860	107,889	
State total	14,625,669	6,437,496	21,063,165	

NORTH DAKOTA.

Bismarck:				
Burleigh	1,279		1,279	Agricultural, grazing.
Emmons	934		934	Do.
Kidder	680		680	Do.
Logan	1,101		1,101	Do.
Mercer	870		870	Do.
Morton and Grant[1]	1,160		1,160	Do.
McIntosh	452		452	Do.
McLean	700		700	Do.
Oliver	276		276	Do.
Sheridan	290		290	Do.
Sioux	10,560		10,560	Do.
Total	18,302		18,302	
Dickinson:				
Billings	6,583		6,583	Rough, grazing.
Bowman	18,260		18,260	Do.
Dunn	7,514		7,514	Do.
Golden Valley	2,560		2,560	Do.
McKenzie	27,720		27,720	Do.
Slope	3,360		3,360	Do.
Total	65,997		65,997	
Minot:				
Benson	202		202	Prairie, farming.
Bottineau	57		57	Grazing.
Burke	613		613	Do.
Cavalier	400		400	Do.
McHenry	1,024		1,024	Do.
McLean	510		510	Do.
Mountrail	7,235		7,235	Do.
Pierce	644		644	Do.
Renville	278		278	Do.
Ward	1,556		1,556	Do.
Total	12,519		12,519	
Williston:				
Burke	121		121	Broken, grazing.
Divide	2,251		2,251	Do.
Mountrail	2,461		2,461	Do.
McKenzie	31,140		31,140	Broken, grazing, farming.
Williams	8,723		8,723	Do.
Total	44,696		44,696	
State total	141,514		141,514	

OKLAHOMA.

Guthrie:				
Alfalfa	130		130	Grazing.
Beaver	1,160		1,160	Do.
Beckham	2,788		2,788	Rough, grazing.
Blaine	456		456	Sandy, grazing.

[1] Morton County divided Jan. 1, 1917.

Statement showing the area of land unappropriated and unreserved on July 1, 1917—Con.

OKLAHOMA—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Guthrie—Continued.				
Canadian	278		278	Sandy, grazing.
Cimarron	7,160		7,160	Grazing.
Cleveland	442		442	Sandy, grazing.
Custer	439		439	Grazing.
Dewey	3,706		3,706	Sandy, grazing.
Ellis	4,225		4,225	Grazing.
Greer	1,283		1,283	Rough, grazing.
Harmon	1,259		1,259	Do.
Harper	75		75	Grazing.
Jackson	1,789		1,789	Rough, sandy, grazing.
Kingfisher	80		80	Sandy, grazing.
Major	3,566		3,566	Rough, grazing.
Pottawatomie	68		68	Sandy, grazing.
Roger Mills	4,684		4,684	Rough, sandy, grazing.
Texas	2,306		2,306	Grazing.
Woods	3,946		3,946	Rough, sandy, grazing.
Woodward	2,293		2,293	Grazing.
State total	42,133		42,133	

OREGON.

Burns:				
Crook	52,321		52,321	Grazing, timber, farming.
Grant	112,917	480	113,397	Do.
Harney	3,478,845	37,596	3,516,441	Do.
Wheeler	6,250		6,250	Do.
Total	3,650,333	38,076	3,688,409	
La Grande:				
Baker	151,500	4,899	156,399	Timbered, mountainous, grazing, mineral, farming.
Grant	54,200		54,200	Timbered, farming, grazing, mineral.
Morrow	10,400		10,400	Timbered, farming, grazing.
Umatilla	38,200	291	38,491	Arid, farming, timbered, grazing.
Union	8,160		8,160	Timbered, farming, grazing.
Wallowa	21,480	10,798	32,278	Mountainous, farming, grazing.
Total	283,940	15,988	299,928	
Lakeview:				
Deschutes and Crook	397,220		397,220	Agricultural, mountainous, grazing.
Klamath	856,133	97,768	953,901	Agricultural, timber, grazing.
Lake	2,210,353	233,636	2,443,989	Agricultural, mountainous, timber, grazing.
Total	3,463,706	331,404	3,795,110	
Portland:				
Benton	2,590		2,590	Hilly, grazing, farming.
Clackamas	9,421		9,421	Mountainous, timber, grazing.
Columbia	80		80	Broken, grazing, agricultural.
Clatsop	1,079		1,079	Do.
Linn	1,392		1,392	Do.
Lincoln	11,360		11,360	Do.
Multnomah	1,040		1,040	Mountainous.
Marion	536		536	Broken, grazing, agricultural.
Polk	760		760	Do.
Tillamook	19,330		19,330	Hilly, timbered, grazing, farming.
Washington	280		280	Do.
Yamhill	330		330	Do.
Total	48,198		48,198	
Roseburg:				
Benton	3,029		3,029	Timber, grazing.
Coos	16,210	1,580	17,820	Timber, agricultural.
Curry	35,406	2,100	37,506	Mountainous, timber.
Douglas	30,485	5,600	36,085	Mineral, grazing, timber.
Jackson	54,293	2,240	56,533	Timber, grazing, fruit.
Josephine	33,058	8,976	42,034	Timber, farming, mineral.

Statement showing the area of land unappropriated and unreserved on July 1, 1917—Con.

OREGON—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Roseburg—Continued.				
Klamath	638		638	Timber.
Lane	28,933		28,933	Timber, farming, mineral.
Lincoln	1,038		1,038	Broken, grazing.
Linn	156		156	Hilly, grazing.
Total	203,276	20,496	223,772	
The Dalles:				
Crook	233,178	1,260	234,438	Grazing, broken, hilly, mountainous.
Deschutes	87,760		87,760	Do.
Gilliam	10,768	1,760	12,528	Do.
Grant	32,844		32,844	Do.
Hood River	40		40	Do.
Jefferson	60,349	7,680	68,029	Do.
Morrow	8,561		8,561	Do.
Sherman	23,575	640	24,215	Do.
Wasco	21,084		21,084	Do.
Wheeler	26,722		26,722	Do.
Total	504,881	11,340	516,221	
Vale:				
Baker	153,865		153,865	Grazing, dry farming, timber.
Grant	11,775		11,775	Mountainous, timber.
Harney	448,347		448,347	Grazing, dry farming.
Malheur	4,008,268	656,862	4,665,130	Grazing, dry farming, some timber.
Total	4,622,255	656,862	5,279,117	
State total	12,776,589	1,074,166	13,850,755	

SOUTH DAKOTA.

Belle Fourche:				
Butte	172,210		172,210	Prairie, grazing, farming.
Harding	52,132		52,132	Do.
Lawrence	280		280	Mountainous.
Meade	8,340		8,340	Broken, grazing.
Total	232,962		232,962	
Gregory:				
Bennett	44,265		44,265	Grazing, sand hills.
Gregory	355		355	Very rough, grazing.
Lyman	40		40	Do.
Mellette	6,600		6,600	Broken, bad lands, grazing.
Total	51,260		51,260	
Lemmon:				
Corson	65,185		65,185	Rough, grazing, land.
Harding	66,892		66,892	Very rough, sandy.
Perkins	18,714		18,714	Rough, broken.
Sioux (N. Dak.)	1,237		1,237	Rolling, stony, broken.
Total	152,028		152,028	
Pierre:				
Brule	120		120	Rough, hilly, grazing.
Campbell	926		926	Do.
Charles Mix	176		176	Do.
Clark	80		80	Low, wet.
Clay	158		158	Low, wet, sand bar.
Day	25		25	Low, wet, small tracts.
Edmunds	240		240	Low, wet, lake bed.
Faulk	110		110	Do.
Haakon	13,015		13,015	Rough, hilly grazing.
Hughes	265		265	Do.
Jackson	25,020		25,020	Do.
Jones	420		420	Do.
Kingsbury	51		51	Low, wet.
Potter	236		236	Rough, hilly, grazing.

Statement showing the area of land unappropriated and unreserved on July 1, 1917—Con.

SOUTH DAKOTA—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Pierre—Continued.				
Spink	320		320	Low, swampy, lake bed.
Stanley	23,991		23,991	Rough, hilly, grazing.
Sully	2,035		2,035	Do.
Walworth	266		266	Do.
Total	67,454		67,454	
Rapid City:				
Custer	25,480	35,163	60,643	Mountainous, timbered, mineral, grazing.
Fall River	57,660		57,660	Prairie, broken, grazing land.
Lawrence	920	18,618	19,538	Mountainous, timbered, mineral, grazing.
Meade	32,160		32,160	Prairie, broken, grazing land.
Pennington	98,420		98,420	Part mountainous, timbered, mineral, part prairie, broken, grazing.
Total	214,640	53,781	268,421	
Timber Lake:				
Corson	37,888		37,888	Grazing, broken, hilly.
Dewey	58,200		58,200	Do.
Ziebach	142,560		142,560	Do.
Total	238,648		238,648	
State total	956,992	53,781	1,010,773	

UTAH.

Salt Lake City:				
Beaver	548,435	720,108	1,268,543	Generally arid, agricultural, mineral, grazing, mountainous.
Box Elder	1,333,850	549,982	1,883,832	Do.
Cache	16,654	227,537	244,191	Do.
Carbon	608,468	22,578	631,046	Do
Davis	31,242		31,242	Do.
Duchesne	119,178	74,880	194,058	Do.
Emery	705,333	644,292	1,349,625	Do.
Garfield	573,647	1,930,329	2,503,976	Do.
Grand	762,649	1,132,186	1,894,835	Do.
Iron	1,015,925	25,175	1,041,100	Do.
Juab	636,362	1,035,498	1,671,860	Do.
Kane	539,797	1,724,663	2,264,460	Do.
Millard	1,089,179	2,272,388	3,361,567	Do.
Morgan	19,708	12,246	31,954	Do.
Piute	109,044	78,795	187,839	Do.
Rich	267,464		267,464	Do.
San Juan	928,386	2,805,857	3,734,243	Do.
Salt Lake	7,092	29,318	36,410	Do.
Sanpete	292,521	40,960	333,481	Do.
Sevier	425,400	81,920	507,320	Do.
Summit	73,063	7,557	80,620	Do.
Tooele	1,560,534	1,955,361	3,515,895	Do.
Utah	43,868	388,101	431,969	Do.
Wasatch	27,153	1,250	28,403	Do.
Washington	742,671	65,645	808,316	Do.
Wayne	197,148	1,078,076	1,275,224	Do.
Weber	74,042		74,042	Do.
Total	12,748,813	16,904,702	29,653,515	
Vernal:				
Duchesne	176,805		176,805	Agricultural, grazing.
Summit	5,785		5,785	Mountainous.
Uinta	882,150	785,403	1,667,553	Arid, mountainous, mineral, agricultural, grazing.
Wasatch	33,273	3,740	37,013	Do.
Total	1,098,013	789,143	1,887,156	
State total	13,846,826	17,693,845	31,540,671	

Statement showing the area of land unappropriated and unreserved on July 1, 1917—Con.

WASHINGTON.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
North Yakima:				
Benton	70,600	.....	70,600	Arid, mountainous.
Grant	21,080	.....	21,080	Do.
Kittitas	57,040	.....	57,040	Arid, mountainous, timbered.
Yakima	48,760	.....	48,760	Do.
Total	197,480	.....	197,480	
Seattle:				
Clallam	1,020	.....	1,020	Burned over mountain.
Jefferson	160	.....	160	Rough.
King	1,140	[1] 68,840	69,980	Timbered, mountainous.
Mason	240	.....	240	Mountainous.
San Juan	640	.....	640	Rough, timbered.
Skagit	2,320	1,800	4,120	Do.
Snohomish	.....	[2] 44,120	44,120	Do.
Whatcom	2,400	1,000	3,400	Rough.
Total	7,920	115,760	123,680	
Spokane:				
Adams	1,100	.....	1,100	Arid, scab land.
Douglas	40	.....	40	Arid, mountainous.
Ferry	234,210	2,066	236,276	Timbered, mineral, grazing.
Lincoln	21,288	.....	21,288	Arid, grazing, farming.
Okanoga	23,320	.....	23,320	Grazing, mineral, farming.
Pend Orielle	39,870	.....	39,870	Mountainous, timbered.
Spokane	975	.....	975	Rough, scab land.
Stevens	114,284	6,877	121,161	Agricultural, grazing, timbered.
Whitman	535	.....	535	Scab land, grazing.
Total	435,622	8,943	444,565	
Vancouver:				
Clarke	4,350	.....	4,350	Foothills, rough, some timber.
Cowlitz	4,300	.....	4,300	Do.
Klickitat	24,420	2,810	27,230	Rough, grazing, little timber.
Lewis	2,765	[3] 65,265	68,030	Do.
Pacific	54	.....	54	Rough.
Skamania	7,176	[4] 82,720	89,896	Mountainous, some timber.
Wahkiakum	118	.....	118	Broken.
Total	43,183	150,795	193,978	
Walla Walla:				
Adams	7,739	.....	7,739	Grazing, desert, poor farming.
Asotin	17,544	.....	17,544	Mountainous, grazing, some farming.
Benton	27,271	.....	27,271	Grazing, desert.
Columbia	2,160	.....	2,160	Mountainous, grazing, some timber.
Franklin	29,850	.....	29,850	Grazing, desert.
Garfield	670	.....	670	Grazing, mountainous.
Klickitat	7,720	.....	7,720	Grazing, desert.
Walla Walla	2,476	.....	2,476	Grazing, some timber.
Whitman	2,561	.....	2,561	Grazing, some farming.
Total	97,991	.....	97,991	
Waterville:				
Chelan	24,117	4,937	29,054	Mountainous, timber, grazing.
Douglas	28,038	.....	28,038	Rough, grazing.
Grant	52,629	.....	52,629	Sandy, grazing.
Kittitas	545	.....	545	Rough, grazing.
Okanogan	115,359	.....	115,359	Mountainous, grazing.
Total	220,688	4,937	225,625	
State total	1,002,884	280,435	1,283,319	

[1] Including 66,920 acres within odd-section grant to the Northern Pacific Ry. Co.
[2] Including 43,880 acres within odd-section grant to the Northern Pacific Ry. Co.
[3] Including 62,010 acres within odd-section grant to the Northern Pacific Ry. Co.
[4] Within odd-section grant to the Northern Pacific Ry. Co.

Statemcnt showing the area of land unappropriated and unreserved on July 1, 1917—Con.

WISCONSIN.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Wausau:				
Adams	297		297	Sandy soil.
Ashland	186		186	Sandy soil, some mixed with loam.
Bayfield	1,450		1,450	Farming, rolling, some sandy.
Buffalo	200		200	Agricultural.
Burnett	275		275	Fair agricultural.
Clark	120		120	Grazing, agricultural.
Chippewa	85		85	Broken.
Crawford	16		16	Agricultural, sandy.
Douglas	422		422	Fair agricultural, some sandy.
Dunn	79		79	Agricultural.
Eau Claire	40		40	Fair agricultural.
Florence	160		160	Rough, hardwood.
Forest	123		123	Do.
Iron	40		40	Do.
Jackson	345		345	Rolling, sandy loam.
Juneau	3		3	Agricultural lands.
La Crosse	82		82	Sandy soil.
Langlade	80		80	Hardwood, broken.
Lincoln	80		80	Fair agricultural.
Marinette	527		527	Agricultural, some sandy.
Monroe	101		101	Agricultural, grazing.
Oconto	110		110	Hardwood, with ledges of rock.
Oneida	503		503	Rocky, sandy, loam soil.
Polk	44		44	Farming.
Price	411		411	Broken, some timbered.
Rusk	95		95	Broken, fair agricultural.
Sauk	40		40	Farming.
Sawyer	165		165	Some timbered, farming.
Trempealeau	40		40	Broken lands.
Washburn	170		170	Sandy clay, agricultural lands.
Wood	40		40	Broken, some sandy.
State total	6,329		6,329	

WYOMING.

Buffalo:				
Big Horn	975,643	45,120	1,020,763	Grazing, mountainous.
Campbell	429,117		429,117	Do.
Converse	9,484		9,484	Do.
Hot Springs	168,030		168,030	Do.
Johnson	1,240,206		1,240,206	Do.
Natrona	50,917		50,917	Do.
Sheridan	214,919	22,840	237,759	Do.
Washakie	1,050,307		1,050,307	Do.
Total	4,138,623	67,960	4,206,583	
Cheyenne:				
Albany	915,441	21,581	937,022	About one-half broken, mountainous; other half prairie, grazing, farming; farm land mostly along streams.
Carbon	1,982,662	10,701	1,993,363	Greater portion broken, mountainous, some timber, agricultural lands along streams.
Fremont	150,758	32,979	183,737	Mountainous, arid, timber.
Goshen	205,114		205,114	Broken, grazing, dry farming.
Laramie	41,262		41,262	Prairie, broken, grazing, dry farming, lands along streams irrigable.
Platte	264,989		264,989	Prairie, broken, grazing, dry farming.
Sweetwater	537,100		537,100	Mountainous, broken grazing, alkaline plains.
Total	4,097,326	65,261	4,162,587	
Douglas:				
Converse	967,233	30,130	997,363	Grazing, mountainous, mineral.
Fremont	958,680		958,680	Do.
Natrona	2,557,842		2,557,842	Do.
Niobrara	460,555		460,555	Do.
Total	4,944,310	30,130	4,974,440	

Statement showing the area of land unappropriated and unreserved on July 1, 1917—Con.

WYOMING—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Evanston:				
Fremont	550,025	583,337	1,133,362	Farming, grazing, mountainous.
Sweetwater	3,766,499	172,393	3,938,892	Dry farming, grazing, alkaline.
Uinta-Lincoln	1,997,732	580,402	2,578,134	Farming, grazing, timber.
Total	6,314,256	1,336,132	7,650,388	
Lander:				
Big Horn	178,923	.....	178,923	Mountainous, farming, grazing, timber lands.
Fremont	1,903,775	41,840	1,945,615	Arid, mountainous, farming, grazing lands, some timber.
Hot Springs	686,518	47,446	733,964	Broken, farming, grazing, some timber land.
Park	869,966	8,034	878,000	Timber land, broken, farming, grazing.
Washakie	31,555	.....	31,555	Broken, farming, grazing.
Total	3,670,737	97,320	3,768,057	
Sundance:				
Campbell	836,414	188,555	1,024,969	Broken, grazing.
Converse	21,784	.....	21,784	Prairie, grazing lands, good for farming.
Crook	228,156	219,305	447,461	Semimountainous, with fertile valleys.
Niobrara	18,084	.....	18,084	Broken, grazing.
Weston	485,147	.....	485,147	Timber, grazing, farming lands.
Total	1,589,585	407,860	1,997,445	
State total	24,754,837	2,004,663	26,759,500	

RECAPITULATION BY STATES.

State.	Area in acres.		
	Surveyed.	Unsurveyed.	Total.
Alabama	33,120	.....	33,120
Arizona	6,402,270	15,906,830	22,309,100
Arkansas	316,560	40	316,600
California	15,103,078	4,402,139	19,505,217
Colorado	8,479,934	1,936,383	10,416,317
Florida	119,464	.....	119,464
Idaho	7,970,227	6,345,881	14,316,108
Kansas	9,363	.....	9,363
Louisiana	38,839	.....	38,839
Michigan	80,319	.....	80,319
Minnesota	587,576	.....	587,576
Mississippi	32,038	.....	32,038
Missouri	274	.....	274
Montana	5,875,675	5,942,739	11,818,414
Nebraska	130,016	.....	130,016
Nevada	30,923,338	24,323,493	55,246,831
New Mexico	14,625,669	6,437,496	21,063,165
North Dakota	141,514	.....	141,514
Oklahoma	42,133	.....	42,133
Oregon	12,776,589	1,074,166	13,850,755
South Dakota	956,992	53,781	1,010,773
Utah	13,846,826	17,693,845	31,540,671
Washington	1,002,884	280,435	1,283,319
Wisconsin	6,329	.....	6,329
Wyoming	24,754,837	2,004,663	26,759,500
Grand total	144,255,864	86,401,891	230,657,755

ALASKA.

The unappropriated lands in Alaska are not included herein. The total area of Alaska is 378,165,760 acres, of which about 23,884,000 acres are reserved. Approximately 850,000 acres have been surveyed under the rectangular system.

REPORT OF THE COMMISSIONER OF PENSIONS.

COMMISSIONERS OF PENSIONS SINCE 1833.

Name.	By whom appointed.	Whence appointed.	Date of commission.
Edwards, James L	Jackson	Virginia	Mar. 3, 1833
Heath, James E	Fillmore	do	Nov. 27, 1850
Waldo, Loren P	Pierce	Connecticut	Mar. 17, 1853
Minot, Josiah	do	New Hampshire	Aug. 1, 1855
Whiting, George C	do	Virginia	Jan. 19, 1857
Barrett, Joseph H	Lincoln	Ohio	Apr. 15, 1861
Cox, Christopher C	Johnson	Maryland	July 28, 1868
Van Aernam, Henry	Grant	New York	May 1, 1869
Baker, James H	do	Minnesota	Apr. 20, 1871
Atkinson, Henry M	do	Nebraska	Mar. 26, 1875
Gill, Charles R	do	Wisconsin	Feb. 10, 1876
Bentley, John A	do	do	Mar. 28, 1876
Dudley, William W	Garfield	Indiana	June 27, 1881
Clarke, Otis P. G	Arthur	Rhode Island	Nov. 15, 1884
Black, John C	Cleveland	Illinois	Mar. 19, 1885
Tanner, James	Harrison	New York	Mar. 27, 1889
Raum, Green B	do	Illinois	Oct. 19, 1889
Lochren, William	Cleveland	Minnesota	Apr. 13, 1893
Murphy, Dominic I	do	Pennsylvania	May 28, 1896
Evans, Henry Clay	McKinley	Tennessee	Apr. 1, 1897
Ware, Eugene F	Roosevelt	Kansas	May 10, 1902
Warner, Vespasian	do	Illinois	Mar. 4, 1905
Davenport, James L	Taft	New Hampshire	Nov. 26, 1909
Saltzgaber, Gaylord M	Wilson	Ohio	May 20, 1913

REPORT OF THE COMMISSIONER OF PENSIONS.

WASHINGTON, D. C., *August 1, 1917.*

The SECRETARY OF THE INTERIOR.

SIR: The operations of the Bureau of Pensions for the fiscal year ended June 30, 1917, are fully shown in the detailed statements and tabulations herewith.

Amounts paid out in fiscal years 1916 and 1917.

FISCAL OPERATIONS.

For pensions:	
1916	$159,155,090
1917	160,895,054
Total cost of administration:	
1916	1,656,722
1917	1,562,855
To pensioners in foreign countries:	
1916	910,848
1917	929,768
For field and special examinations:	
1916	84,721
1917	79,503
For fees and expenses of examining surgeons:	
1916	47,866
1917	35,627
Appropriation—Salaries, Pension Office, 1917	1,460,790
Expenditures—Salaries, Pension Office, 1917	1,418,655

INTERESTING FACTS.

The following information regarding matters connected with the payment of pensions is of general interest:

Total pensioners on the roll June 30:		
1916		709,572
1917		673,111
Invalids	369,936	
Widows	293,739	
Dependents	5,145	
Minors	3,142	
Helpless children	938	
Nurses	211	
Civil War soldiers on the roll June 30:		
1916		362,277
1917		329,226
Civil War widows on the roll June 30:		
1916		286,080
1917		284,216

Number of deaths:	
Civil War soldiers—	
1916	34,252
1917	33,232
Widows, minor children, and dependents—	
1916	19,957
1917	20,130
The largest number of Civil War soldiers on the roll was in 1898	745,822
The largest number of Civil War widows on the roll was in 1912	304,373
War of 1812 widows surviving June 30, 1917	109
War with Mexico, June 30, 1917:	
Survivors	384
Widows	3,422
War with Spain:	
Total number of original claims allowed by Pension Bureau	39,564
Number on rolls June 30, 1917	28,275
Changes of post-office addresses of pensioners:	
1916	120,796
1917	130,164
Employees at the beginning of the fiscal year:	
1916	1,182
1917	1,115
Volumes in military library:	
1916	1,455
1917	1,695
Total pieces of mail handled in 1917:	
Incoming	1,142,928
Outgoing	3,712,880
Inclosures	1,432,868
Cases under act Mar. 3, 1899 (division of pension between husband and wife), 1917	2,228
Cases under act Aug. 8, 1882 (to wife where husband is insane or imprisoned), 1917	96
Cases under guardianship, 1917	8,478
Amount of fees paid to attorneys, 1917	$100,554
Income, refundments, etc.:	
For addresses, certified copies, etc. (act Aug. 24, 1912)	$8,682.43
Refundments to pension appropriations	4,772.97
Miscellaneous	285.67
Total	13,741.07
Reimbursements:	
Amount allowed, expenses of last sickness and burial, for 1916	$208,898.19
Amount allowed, expenses of last sickness and burial, for 1917	$226,982.56
Medal-of-honor roll (act Apr. 27, 1916):	
Total number entered on roll	351
Amount paid 1917	$41,582.00
Recoveries on former wrongful adjudications:	
1916	$79,915.28
1917	$40,747.77

[1] This includes admissions to and discharges from national military homes not heretofore reported as changes of post-office address in the commissioner's annual reports.

THE ASHBROOK BILL INCREASING PENSION TO WIDOWS.

On September 8, 1916, the President approved an act which increased the pension of a large number of widows from $12 to $20 per month. The increase was given—

First. To a widow who was the lawful wife of an officer or enlisted man in the Army, Navy, or Marine Corps of the United States during the period of his service in the Civil War; and

Second. To a widow of an officer or enlisted man who served in the Civil War, the War with Mexico, or the War of 1812, then on the roll, or thereafter to be placed there, who had reached or should thereafter reach the age of 70 years.

The act also made again pensionable the widow of an officer or enlisted man who served during the Civil War who had been placed on the pension roll under any existing law, and whose name had been dropped from said roll by reason of her marriage to another person who has since died, or from whom she has been heretofore divorced upon her own application and without fault on her part.

Also by this act a pension was given to any widow who married the soldier or sailor prior to June 27, 1905, if the soldier or sailor had the requisite service. Formerly such pension was not given to any widow who married the soldier or sailor subsequent to June 27, 1890, but now the limit has been extended 15 years, as stated.

There were received and classified in the Law Division during the year 98,759 applications of all kinds, 51,481 of which were under sections 2 and 3 of the act of September 8, 1916. The total of 117,552 shown in Exhibit 24 is the number of all applications received in the Mail and Supplies Division, many of which, upon examination by the Law Division, were not accepted as formal applications.

The work under this law was entered upon in the Pension Bureau with great vigor with the purpose of expediting and distributing the generosity of the Government to the widows who were made beneficiaries by said act.

No particular form of declaration for increase was required of those on the roll, but it was sufficient to communicate to the bureau, by letter or otherwise, that a widow had title under said law. The fact of the passage of the law and the attitude of the bureau was published everywhere, and the applications came to the bureau in a great flood, thousands being received daily.

Up to and including June 30, 1917, pensions of 157,248 widows had been increased under the first section of the act. Under the second and third sections 51,481 claims have been filed, of which 11,811 claims have been admitted, and 5,445 claims rejected. In the others calls have been made for testimony and the claims are still pending.

The Secretary on March 27, 1917, announced a decision holding that a widow of a soldier of the Civil War who had contracted two or more marriages subsequent to the soldier's death was not entitled to pension under that act. It was held that—

The language of section 2 does not contemplate her having contracted more than one such marriage; rather, what it does contemplate (and this should not be lost sight of) is that a second marriage by a soldier's widow defeats title to pension which it grants. The language of that part of the act deals with but one marriage, and that is the first marriage since the soldier's death.

The following shows the dates of marriage of widows who were married to the soldiers subsequent to June 27, 1890, and prior to June 27, 1905, and who were granted original pensions by said act:

1890	316	1899	347
1891	561	1900	328
1892	533	1901	308
1893	519	1902	306
1894	472	1903	300
1895	460	1904	282
1896	464	1905	100
1897	455		
1898	396	Total	6,147

The following statement shows the estimated cost of the act of September 8, 1916, since the date of the passage of said act to June 30, 1917:

	Number.	Annual value.
Widows increased from $12 to $20 per month	155,170	$14,896,320
Widows increased from $15 to $20 per month	624	37,440
Widows increased from $16 to $20 per month	72	3,456
Widows increased from $17 to $20 per month	926	33,336
Total	156,792	14,970,552
Widows married after June 27, 1890, and prior to June 27, 1905	6,147	1,475,280
Remarried widows	1,266	303,840
Total number and annual value	164,205	16,749,672
Estimated cost for 8 months		11,166,448

The following shows the number of widows of the ages of 70 and over who were added to the roll under said act:

70	22,346	88	184
71	12,745	89	95
72	12,314	90	86
73	9,801	91	50
74	7,781	92	29
75	6,494	93	33
76	5,148	94	17
77	3,245	95	3
78	2,750	96	7
79	1,965	97	7
80	1,762	98	5
81	1,144	99	2
82	960	102	2
83	801	103	2
84	581		
85	427	Total	91,432
86	404	Number of war widows increased	67,431
87	242		

INDIAN WAR SURVIVORS.

On March 4, 1917, there was approved an act to pension the survivors of certain Indian wars and the widows of those engaged therein.

The provisions of the act itself are very complex and may not give the general public a proper understanding of them. The following analytical statement has been prepared in the Pension Bureau.

This act in connection with the acts of July 27, 1892, and February 19, 1913, grants pension at the rate of $20 per month from the date of its passage, as follows:

Survivors of the Texas volunteers who served for 30 days in defense of the frontier of that State against Indian depredations from January 1, 1859, to January 1, 1861, inclusive, and from 1866 to 1877, inclusive.

Survivors of the military service of the United States who have reached the age of 62 years and who served for 30 days—

1. In the campaign in southern Oregon and Idaho and in northern California and Nevada from 1865 to 1868, inclusive.

2. In the campaign against the Sioux in Minnesota and the Dakotas in 1862 and 1863, and in Wyoming in 1865 to 1868.

3. In fighting Indians and guarding United States mails on western frontier as members of—

(*a*) Company A, First Regiment, First Brigade Nebraska Militia, from August 30, 1864, to November 12, 1864.

(*b*) Company B, First Regiment Nebraska Militia, August 13, 1864, to February 13, 1865.

(*c*) Company C, First Regiment, Second Brigade Nebraska Militia, from August 24, 1864, to February 7, 1865.

(*d*) Capt. Edward P. Childs's Artillery detachment, Nebraska Militia, from August 30, 1864, to November 12, 1864.

(*e*) Company A, First Regiment, Second Brigade Nebraska Militia, from August 12, 1864, to December 24, 1864.

4. In the campaign against the Cheyennes, Arapahoes, Kiowas, and Comanches in Kansas, Colorado, and Indian Territory from 1867 to 1869, inclusive.

5. In the Modoc War of 1872 and 1873.

6. In the campaign against the Apaches of Arizona and New Mexico or either of them in 1873, and in 1885 and 1886.

7. In the campaign against the Kiowas, Comanches, and Cheyennes in Kansas, Colorado, Texas, Indian Territory, and New Mexico in 1874 and 1875.

8. In the campaign against the Northern Cheyennes and Sioux in 1876 and 1877.

9. In the Nez Perce War of 1877.

10. In the Bannock War of 1878.

11. In the campaign against the Northern Cheyennes in 1878 and 1879.

12. In the campaigns in the Black Hawk War in Utah from 1865 to 1867, inclusive.

13. In the campaign against the Utes in Colorado and Utah from September, 1879, to November, 1880, inclusive.

14. In the campaign against the Sioux in South Dakota from November, 1890, to January, 1891, inclusive.

This act also grants pension to the widows of those who served as above indicated, if marriage occurred prior to March 4, 1917, provided said widows have not remarried. The rate is $12 per month commencing March 4, 1917, or from the date of death of the soldier subsequent to that date.

This act grants pension of $20 per month also to the survivors of Tyler's Rangers recruited at Black Hawk, Colo., in 1864.

If any of the campaigns named above did not cover a period of 30 days, the provisions of this act apply to those who served during the entire period of said campaign.

A formal declaration for pension under this act must be filed in the Pension Bureau.

An agent or attorney, admitted to practice before the Department of the Interior and its bureaus, may be recognized in the prosecution of a claim filed under this act.

Agreements for fee in excess of $25 will not be recognized. When no fee agreements are filed, a fee of $10 will be allowed.

Fee agreements in claims under this act made prior to its passage are null and void.

Up to and including June 30, 1917, under the act of March 4, 1917, there had been 6,517 claims accepted and classified by the Law Division, almost all of which are still pending awaiting detailed information called for as to identity of party, and character and length of service.

The total of 6,615 shown in Exhibit 24, includes all Indian War claims under the act of March 4, 1917, and prior laws, received in the Mail and Supplies Division during the fiscal year.

MEDAL OF HONOR ROLL.

By the act of April 27, 1916, providing for the Army and Navy medal of honor roll, a special pension of $10 per month for life, payable quarter yearly, in addition to any other pension under any existing or subsequent law, was granted to every person who has reached the age of 65 years who was placed on said roll. By that law it was made the duty of the Secretary of War and the Secretary

of the Navy to certify to the Commissioner of Pensions the names of persons entered on said roll, and that certificate is made full and sufficient authority to the Commissioner of Pensions for the payment by him to the beneficiary named in each certificate.

FINAL REMOVAL OF CONFEDERATE DISABILITIES.

Section 4716, Revised Statutes, provided that no money on account of pension should be paid to any person, or to the widow, children, or heirs of any deceased person, who in any manner voluntarily engaged in, or aided or abetted, the late rebellion against the authority of the United States. That limitation was removed in specific cases by numerous statutes, and on August 29, 1916, it was finally repealed.

SPECIAL ACTS.

During the year 25 omnibus bills were passed granting pension or increase of pension, representing 4,178 individual cases. In 62 of such cases the beneficiary died prior to the approval of the bill granting the relief.

Requests to the number of 3,211 by the Pension Committees of the Senate and House of Representatives for the transmittal of claims were complied with.

DIVISION OF PENSION.

Under the act of March 3, 1899, providing for division of pension of resident pensioners of the United States who have deserted their wives or children or who are inmates of soldiers' or sailors' homes, altogether 16,627 claims have been filed; in 9,449 of them the division of pension was allowed, and in 7,060 the division was denied. On July 1, 1916, there were 178 such claims pending, and during the year 438 claims of this class were filed or renewed; 359 were allowed; 139 were denied; and 118 were pending on June 30, 1917.

Under the act of August 8, 1882, of claims of wives and children of pensioners undergoing imprisonment, or insane without a guardian, 23 were allowed and 16 were not allowed.

Of claims under the act of February 2, 1909, of the dependents of pensioners confined in St. Elizabeths Hospital, 13 were allowed and 4 rejected.

WAR OF 1917.

The different claims in the Pension Bureau, from the foundation of the Republic up to the present time, have been classified and named according to the war out of which they arose. Starting in with claims arising out of the present war, it was believed that they should not be classed under the name "the war with Imperial Germany,"

because it seemed probable that difficulties with other nations would grow out of the present war, and those claims, if any, would be regarded as in the same class, so after due deliberation it was determined that all claims arising out of military or naval service rendered subsequent to April 6, 1917, and prior to the proclamation of peace, should be charged to a class to be known as War of 1917. Up to June 30, 1917, 11 claims had been presented based on such service. At the time this report was written the number of such claims had very materially increased, and it is feared that because of military operations which are anticipated the number may further increase very rapidly. Even if peace should be declared, the mere fact of the existence of such a large number of men as are in the Army, Navy, and Marine Corps would alone give reason to expect many claims on account of injury from accident and disability from disease.

The pension laws are applicable to all those who serve in the present war in the Army, Navy, or Marine Corps.

When any officer or enlisted man of the National Guard is drafted into the service of the United States, the law passed June 3, 1916, provides that he shall be entitled to all the benefits of the pension laws. That same provision is made applicable to any officer or enlisted man drafted into the service of the United States pursuant to the provisions of the joint resolution of July 1, 1916.

For aviation service the Congress by the act of March 3, 1915, made the following provision:

"* * * In all cases where an officer or enlisted man of the Navy or Marine Corps dies, or where an enlisted man of the Navy or Marine Corps is disabled by reason of any injury received or disease contracted in line of duty, the result of an aviation accident, received while employed in actual flying in or in handling air craft, the amount of pension allowed shall be double that authorized to be paid should death or the disability have occurred by reason of an injury received or disease contracted in line of duty, not the result of an aviation accident."

Apparently no particular provision has been made for those attached to the aviation service in the Army of the United States.

OFFENSES AND RECOVERIES.

During the year 32 cases were presented to the Department of Justice for prosecution on account of offenses against the pension laws. These were in addition to those which had been presented in prior years not all of which had been acted upon. Indictments were found in 48 cases; 31 cases were brought to trial; in 30 cases

convictions were had, and in 1 there was an acquittal. The acquittal was in the case of a man charged with impersonating an officer of this bureau. Five cases were disposed of by nolle prosequi; in 7 cases presented to the grand jury no indictments were found; at the close of the year there were 57 cases pending for prosecution.

Two civil suits were compromised for $2,000 and $900, respectively, under direction of the Department of Justice. The sum of $3,018.40 was recovered without resort to court proceedings.

The foregoing does not include recoveries, through the Board of Review, from pensioners, on former wrongful adjudications. This has amounted in two years to the sum of $120,663.05.

ECONOMIES.

In numerous ways the bureau has endeavored to economize in both material and labor.

Heretofore letters were written in double space, but after consultation and comparisons, it was determined that a great saving could be effected by writing them in single space, which was ordered and is now done. Since very many thousands of letters are written in the Pension Bureau each year, this saving will be very great.

Where whole manila sheets were used with the files of cases, it was determined that half sheets would serve the same purpose, and thus another saving was effected.

Thousands of file slips which were used and discarded have been again utilized by crossing out the marks on the side once used and using the opposite side of the slip.

In other respects efforts are made to effect savings which in no manner interfere with the efficiency of the work.

REDUCTION OF THE FORCE.

The legislative, executive, and judicial appropriation act for the fiscal year 1918 provided for 24 fewer employees than were on our rolls June 30, 1917, and continued the provision limiting appointments in the Pension Bureau in any one grade to 25 per cent of the vacancies occurring in that grade during the fiscal year. During the fiscal year 1917 vacancies occurred in the classified service of the Pension Bureau to the number of 64.

Fourteen appointments were made as follows:

Pension Office	12
Appointments made in the Secretary's Office under decision of the Comptroller of the Treasury dated June 22, 1917	2
Total	14

EMPLOYEES IN EACH DIVISION.

The number of employees of each division in the Pension Office on July 1, 1917, was as follows:

Commissioner	1
Deputy Commissioner	1
Army and Navy Division	119
Board of Review	69
Certificate Division	45
Chief Clerk's branch	67
Civil War Division	186
Disbursing Office	117
Finance Division	97
Law Division	49
Mail and Supplies Division	40
Medical Division	30
Record Division	95
Special Examination Division	68
Superintendent's branch	57
Watch force	22
Total	1,063
Vacancies existing July 1, 1917	28
Total number allowed by law	1,091

AGES OF EMPLOYEES.

Number of employees in the Bureau of Pensions July 1, 1917, who were in the classified civil service	1,013
Number between 70 and 80 years of age	172
Number over 80 years of age	19
Total number eligible for retirement [1]	191
Per cent eligible for retirement [1]	18.85
Age of oldest employee	86
Average age of all employees	57

PHOTOSTAT.

Photostat copies of documents were made aggregating 12,006 pages, making a total of 21,801 pages since the photostat machine was installed December 4, 1915.

During the year the sum of $406.70 was received for photostat copies of documents furnished under the act of August 24, 1912.

[1] Based on age 70.

NONPAYMENT OF PENSIONS TO RESIDENTS OF GERMANY.

Prior to the beginning of 1917, because of the difficulty in transmitting mail to pensioners residing in Germany, the Pension Bureau had made arrangement with the Secretary of State by which pension vouchers and checks were transmitted in the diplomatic pouch. Difficulties continued to multiply and when diplomatic relations were severed February 3, 1917, the bureau was unable to deliver such checks. Therefore, on February 5, 1917, an order was issued saying all such vouchers, checks, and any other communication for anybody within the limits of Germany should be withheld during the discontinuance of diplomatic relations with that country, and that for the present consideration need not be given to pending claims from applicants residing in such country. There was also in said order the statement that the same order should apply to any other foreign country upon the discontinuance with it of diplomatic relations.

The rights of pensioners residing in Germany were not determined by the commissioner. In the absence of any other regulation by Congress, payment of accumulated pension would be made to them upon their being in territory where they could be reached by the ordinary course of mail.

MILITARY BOUNTY LAND WARRANTS.

During the last year there was issued one warrant for 120 acres.

There were 5 claims on hand at the beginning of the year, and 11 received during the year, of which 1 was allowed; 6 were rejected; 1 was abandoned; and 8 are still pending.

The following statement shows the total number of warrants of all classes issued by this bureau, and the total number of acres granted up to July 1, 1917, viz:

	Number.	Acres.
War of the Revolution	16,663	2,666,080
War of 1812	29,471	4,891,520
Act of 1847	88,274	13,213,640
Act of 1850	189,146	13,168,560
Act of 1852	11,992	694,400
Act of 1855	263,155	34,159,670
Total	598,701	68,793,870

VOLUNTEER OFFICERS' RETIRED LIST.

DEPARTMENT OF THE INTERIOR,
Washington, March 30, 1916.

Hon. JAMES HAY,
Chairman Committee on Military Affairs,
House of Representatives.

MY DEAR MR. HAY: I beg to submit herewith, pursuant to your request, a tabulated statement prepared from data supplied by the pension roll, showing the number of officers and the annual cost involved in legislation as proposed by bill H. R. 386, to create a Civil War volunteer officers' retired list, as follows:

OFFICERS WHO SERVED 2 YEARS AND OVER.

Rank.	Number.	Active pay.	Proposed retired pay.	Total annual retired pay.	Annual pension to be relinquished.
Brigadier general	7	$6,000.00	$1,800.00	$12,600.00	$2,880.00
Colonel	76	4,000.00	1,800.00	136,800.00	30,408.00
Lieutenant colonel	209	3,500.00	1,750.00	365,750.00	76,128.00
Major	424	3,000.00	1,500.00	636,000.00	151,632.00
Captain	2,872	2,400.00	1,200.00	3,446,400.00	995,940.00
First lieutenant	3,977	2,000.00	1,000.00	3,977,000.00	1,345,812.00
Second lieutenant	2,415	1,700.00	850.00	2,052,750.00	808,821.00

OFFICERS WHO SERVED 1 YEAR AND LESS THAN 2 YEARS.

Colonel	13	$4,000.00	$900.00	$11,700.00	$4,332.00
Lieutenant colonel	33	3,500.00	875.00	28,875.00	12,396.00
Major	66	3,000.00	750.00	49,500.00	20,298.00
Captain	519	2,400.00	600.00	311,400.00	157,596.00
First lieutenant	822	2,000.00	500.00	411,000.00	239,979.00
Second lieutenant	797	1,700.00	425.00	338,725.00	227,289.00

OFFICERS WHO SERVED 6 MONTHS AND LESS THAN 1 YEAR.

Colonel	5	$4,000.00	$450.00	$2,250.00	$1,290.00
Lieutenant colonel	10	3,500.00	437.50	4,375.00	2,700.00
Major	29	3,000.00	375.00	10,875.00	7,827.00
Captain	212	2,400.00	300.00	63,600.00	54,480.00
First lieutenant	106	2,000.00	250.00	26,500.00	23,712.00
Second lieutenant	6	1,700.00	212.50	1,275.00	1,008.00

Total number of officers	12,598
Total annual retired pay	$11,887,375
Total pension to be relinquished	$4,164,528
Annual cost of retirement as proposed by the bill	$7,722,847

Naval officers are included in the above tabulation by relative rank.

There were on the pension roll on February 29, 1916, a total of 13,534 Regular and Volunteer officers who served six months or longer in the Civil War. The difference of 936 between that number and the number given in the table represents those who are in receipt of pension in excess of what they might obtain as retired pay under the provisions of the bill.

No estimate can be given of the additional cost involved by the provision for maximum retired pay, regardless of length of service, to

officers who lost an eye, an arm, or a leg, or were discharged by reason of wounds, etc., without a tabulation by disabilities as shown in their claims, which has not been undertaken because of the time and labor that would be involved.

The letter of Hon. John E. Raker addressed to you under date of the 20th instant and copy of bill received therewith, on which is indorsed the request for the above information, are herewith returned.

Very truly, yours,

ANDRIEUS A. JONES,
Acting Secretary.

NAVAL HOME.

A provision of the naval appropriation act of June 30, 1914 (38 Stat. L., 398), requires that the pensions of beneficiaries of the Naval Home at Philadelphia be held in trust to be paid to the pensioners at their discharge, if not sooner paid to them, in the same manner as provided for inmates of the United States Soldiers' Home in section 4 of the act of March 3, 1883 (22 Stat. L., 564).

Said provision made no change, however, in the conditions of payment of their pensions while in the Naval Home, and they differ materially from the conditions for payment of the pensions of Soldiers' Home inmates. Prior to such provision their pensions paid under section 4813, Revised Statutes, as amended by the act of May 4, 1898 (30 Stat. L., 377), were forfeited to the fund for the home's maintenance, and this forfeiture feature continues in force with the pensions of inmates of naval hospitals. Said section was held, therefore, to apply only to the pension accruing for periods of the pensioner's actual presence in and maintenance by the home, the pension accruing to date of admission or for any period of absence from the home, on furlough or otherwise, if but for one day, being payable to the pensioner, and for which he must execute a voucher. On the other hand, payments to the Soldiers' Home, being in trust for the pensioner, are of all pension due the inmate regardless of date of admission or periods of absence on furlough. A like provision for the Naval Home, doing away with the conditions noted, and which seem to be no longer necessary, would relieve the home and this bureau of many administrative details incident to payment and accounting, due to the constant breaking up of quarterly and other payments between the home and the pensioner, and would also be of advantage to the pensioner by relieving him of the trouble and expense of executing vouchers for pension accruing for periods of absence from the home.

To extend to the Naval Home the provision of section 4 of the act of March 3, 1883, under which Soldiers' Home pensions are paid, would be to give wider effect to an objectionable feature of that pro-

vision which authorizes the pensioner to assign all or a part of his pension to a child, wife, or parent, by a written direction to the pension agent. Literal observance of this provision requires proof of identity and relationship and the preparation and execution by the assignee of special forms of vouchers. Furthermore, payments to an assignee in varying amounts are not possible without new assignments for each variance. The provision might well be stricken from the law, as a simpler and more expeditious process is open to the pensioner by obtaining from the treasurer of the home such part of his pension as he may desire to transmit to relatives, which probably accounts for the fact that no assignments thereunder are now in effect. This would not be the case, for a time at least, with the extension of the privilege to a new group of pensioners. With assignments heretofore made in the early years following the act complications were avoided by payment of the entire pension direct to the assigning pensioner, but such method would doubtless not find favor with new assignments.

A provision in further amendment of section 4813, Revised Statutes, or to take its place, would perhaps best serve the desired purpose, and by such means inmates of naval hospitals could be placed on the same footing with inmates of the Naval Home, if desirable.

It may be noted, in this connection, that the provisions of the acts of February 26, 1881 (21 Stat. L., 350), and August 7, 1882 (22 Stat. L., 322), under which the pensions of inmates of the National Home for Disabled Volunteer Soldiers are paid, require that all pensions and arrears of pensions of such inmates be paid to the treasurers of the home, to be disbursed for the benefit of the pensioners, without deduction for fines or penalties, and the act of March 3, 1899 (30 Stat. L., 1379), makes provision for the families of inmates of State and National Soldiers' Homes by authorizing payment of one-half their pensions to a wife, or children under 16 years of age or permanently helpless.

ATTORNEYS.

There are 27,628 persons or firms entitled to recognition as attorneys or agents before the bureau, 352 of whom were admitted and 5 restored during the fiscal year, 8 were disbarred, 8 relinquished their right to practice, 2 were suspended from practice, 13 were prohibited under section 109 of the Criminal Code, 64 died, and in one case the admission to practice was canceled and revoked.

Powers of attorney and fee agreements examined numbered 10,484. Contests between attorneys for recognition in claims were settled in 946 cases.

Ordinarily the conduct of the attorneys and agents is in keeping with the rules prescribed for their guidance, but occasionally one will overstep the bounds and do things which are deserving of censure.

FINALLY.

The employees of the Pension Bureau are worthy of praise for their extraordinary zeal and industry in promptly disposing of a great flood of claims arising under the Ashbrook law favorable to widows of soldiers and sailors.

The employees loyally respond to every call of duty.

Respectfully submitted.

G. M. SALTZGABER,
Commissioner.

STATISTICAL TABLES.

EXHIBIT 1.—*Pensioners on the roll June 30, 1917, and June 30, 1916.*

Classes.	1917	1916	Gain.	Loss.
Regular Establishment:				
Invalids	15,702	15,553	149	.....
Widows	2,962	2,937	25	.....
Minor children	237	221	16	.....
Mothers	1,209	1,208	1	.....
Fathers	166	169	.....	3
Brothers, sisters, sons, and daughters	7	6	1	.....
Helpless children	5	8	.....	3
Civil War:				
Act Feb. 6, 1907—				
Survivors	1,345	1,727	.....	382
Act of May 11, 1912—				
Survivors	291,268	320,276	.....	29,008
General law—				
Invalids	36,076	39,593	.....	3,517
Nurses	211	252	.....	41
Widows	47,491	50,544	.....	3,053
Minor children	119	162	.....	43
Mothers	329	452	.....	123
Fathers	27	34	.....	7
Brothers, sisters, sons, and daughters	643	432	211	.....
Helpless children	430	593	.....	163
Act June 27, 1890—				
Invalids	537	681	.....	144
Minor children	2,627	3,240	.....	613
Helpless children	498	485	13	.....
Acts Apr. 19, 1908 and Sept. 8, 1916—				
Widows without children	234,069	232,740	1,329	.....
Widows with children	2,656	2,796	.....	140
War with Spain:				
Invalids	24,060	24,101	.....	41
Widows	1,287	1,270	17	.....
Minor children	159	170	.....	11
Mothers	2,407	2,548	.....	141
Fathers	355	374	.....	19
Brothers, sisters, sons, and daughters	2	3	.....	1
Helpless children	5	6	.....	1
War of 1812:				
Widows	109	115	.....	6
War with Mexico:				
Survivors	384	513	.....	129
Widows	3,422	3,785	.....	363
Indian wars:				
Survivors	564	676	.....	112
Widows	1,743	1,902	.....	159
Total	673,111	709,572	1,762	38,223
Net loss to the roll	.....	.....	.....	36,461

DEATHS BY MONTHS.

Statement showing loss to pension roll by death July 1, 1916, to June 30, 1917, inclusive.

Months.	Invalids.		Widows, etc.		Total.
	Civil war.	Other classes.	Civil war.	Other classes.	
July	2,382	71	1,261	40	3,754
August	2,404	88	1,442	111	4,045
September	2,169	100	1,346	57	3,672
October	2,367	74	1,112	34	3,587
November	2,398	87	1,464	97	4,046
December	2,177	97	1,428	50	3,752
January	3,361	106	1,720	77	5,264
February	3,292	84	2,103	139	5,618
March	3,688	127	2,079	106	6,000
April	3,220	104	1,732	59	5,115
May	2,958	99	1,864	136	5,057
June	2,816	127	1,610	63	4,616
Total	33,232	1,164	19,161	969	54,526

EXHIBIT 2.—*Pensioners added to and dropped from the roll, the number on the roll at the beginning and at the close of the year, and the amount disbursed to each class of pensioners during the year ended June 30, 1917.*

Classes.	Number of pensioners beginning of year.	Gains to the roll.			Gains to classes, transfer from other classes.				Losses to the roll by—					Losses to classes.	Number of pensioners end of year.	Disbursements.
		Original.	Restoration.	Renewal.	Original.	Restoration.	Renewal.	Reissue.	Death.	Remarriage.	Limitation.	Failure to claim.	Other causes.			
Regular Establishment:																
Army—																
Invalids	11,410	526	1	10				1	390			12	51	4	11,491	$1,970,637.79
Widows, etc	2,918	188						106	118	34	12	1	1	89	2,957	584,759.33
Navy—																
Invalids	4,143	241	7	10					143			7	39	1	4,211	773,929.29
Widows, etc	1,631	99						19	63	16	7	1	1	32	1,629	336,714.31
Civil War:																
Act Feb. 6, 1907—																
Army	1,649	16	8	1				2	193			4	1	191	1,287	273,664.72
Navy	78	1	1						6					16	58	13,216.44
Act May 11, 1912—																
Army	310,136	206		15	1		16	1,464	27,944			47	43	1,647	282,157	83,182,269.09
Navy	10,140	22						29	1,025			9	3	43	9,111	2,580,150.23
General law—																
Army—																
Invalids	39,070	24		5			44	1,604	3,934			9	5	1,214	35,585	13,241,700.26
Nurses	252								27				3	11	211	32,050.60
Widows, etc	51,449	446	8	206	1		6	478	4,127	55	40	10	7	45	48,310	9,592,717.57
Navy—																
Invalids	523						2	37	60			1		10	491	170,730.62
Widows, etc	768	7	3	4				21	71	1				2	729	151,786.26
Act June 27, 1890—																
Army—																
Invalids	638	8	3			1			68			2	3	77	500	82,343.64
Minors, etc	3,604	243		6				12	59		447	83	24	243	3,018	631,060.64
Navy—																
Invalids	43								2			1		3	37	5,625.21
Minors, etc	121	27							2		19	2	1	17	107	20,719.27
Acts Apr. 19, 1908, and Sept. 8, 1916—																
Army widows	226,770	15,309	7	898	271		21	125	14,337	395		28	29	580	228,032	40,662,899.75
Navy widows	8,766	480		37	4			32	574	8		5		39	8,693	1,529,644.27

EXHIBIT 2.—*Pensioners added to and dropped from the roll, the number on the roll at the beginning and at the close of the year, and the amount disbursed to each class of pensioners during the year ended June 30, 1917*—Continued.

Classes.	Number of pensioners beginning of year.	Gains to the roll.			Gains to classes, transfer from other classes.				Losses to the roll by—					Losses to classes.	Number of pensioners end of year.	Disbursements.
		Original.	Restoration.	Renewal.	Original.	Restoration.	Renewal.	Reissue.	Death.	Remarriage.	Limitation.	Failure to claim.	Other causes.			
War with Spain:																
Army—																
Invalids	23,372	429	6	27					348			20	133	1	23,332	$2,980,857.09
Widows, etc	4,129	121	2	3				1	172	31	19	9	8	33	3,984	653,873.64
Navy—																
Invalids	729	10							9			1	1		728	106,201.01
Widows, etc	242	4						1	8	3	1	2		2	231	42,748.20
War of 1812:																
Widows	115		2	1					9						109	18,701.94
War with Mexico:																
Survivors	513	3						2	133			1			384	158,134.59
Widows	3,785	43		2					404	2		2			3,422	683,920.80
Indian wars:																
Survivors	676	1		1					114						564	143,099.07
Widows	1,902	42							195	4		1		1	1,743	270,898.31
Total	709,572	18,496	48	1,226	277	1	89	3,934	54,526	549	545	258	353	4,301	673,111	160,895,053.94

Amount disbursed on account of Regular Establishment	$3,666,040.72
Amount disbursed on account of Civil War	152,170,578.57
Amount disbursed on account of War with Spain	3,783,679.94
Amount disbursed on account of War of 1812	18,701.94
Amount disbursed on account of War with Mexico	842,055.39
Amount disbursed on account of Indian wars	413,997.38

EXHIBIT 2A.—*Number of pensioners on the roll, by classes, at the close of the fiscal year ended June 30, 1917, and disbursements made during the year.*

Classes.	Number.	Disbursements.
Regular Establishment:		
Army—		
Invalids	11,491	$1,970,637.79
Widows	1,950	421,564.24
Minor children	163	30,665.69
Dependent relatives	840	131,767.40
Helpless children	4	762.00
Navy—		
Invalids	4,211	773,929.29
Widows	1,012	245,725.71
Minor children	74	12,431.40
Dependent relatives	542	78,417.20
Helpless children	1	140.00
Civil War:		
Act Feb. 6, 1907—		
Army	1,287	273,664.72
Navy	58	13,216.44
Act May 11, 1912—		
Army	282,157	83,182,269.09
Navy	9,111	2,580,150.23
General law—		
Army—		
Invalids	35,585	13,241,700.26
Nurses	211	32,050.60
Widows	46,784	9,351,373.75
Minor children	116	36,837.81
Dependent relatives	982	137,912.01
Helpless children	428	66,594.00
Navy—		
Invalids	491	170,730.62
Widows	707	148,922.13
Minor children	3	313.33
Dependent relatives	17	2,212.80
Helpless children	2	338.00
Act June 27, 1890—		
Army—		
Invalids	500	82,343.64
Minor children	2,532	558,230.90
Helpless children	486	72,829.74
Navy—		
Invalids	37	5,625.21
Minor children	95	18,591.27
Helpless children	12	2,128.00
Acts Apr. 19, 1908, and Sept. 8, 1916—		
Army widows	228,032	40,662,899.75
Navy widows	8,693	1,529,644.27
War with Spain:		
Army—		
Invalids	23,332	2,980,857.09
Widows	1,188	233,097.52
Minor children	153	28,053.92
Dependent relatives	2,638	391,784.20
Helpless children	5	938.00
Navy—		
Invalids	728	106,201.01
Widows	99	23,306.53
Minor children	6	1,127.27
Dependent relatives	126	18,314.40
War of 1812:		
Widows	109	18,701.94
War with Mexico:		
Survivors	384	158,134.59
Widows	3,422	683,920.80
Indian wars:		
Survivors	564	143,099.07
Widows	1,743	270,898.31
Total	673,111	160,895,053.94

EXHIBIT 3.—*Statement showing the number of pensioners in each class under the general pension laws and special acts of Congress, together with the annual value of each on the rolls at the close of the fiscal year ended June 30, 1917.*

	General laws.		Special acts.	
	Number.	Annual value.	Number.	Annual value.
Invalids, Regular Establishment	15,224	$2,543,031.38	478	$111,216.00
Widows, etc., Regular Establishment	4,080	717,216.00	506	178,000.00
Survivors, act Feb. 6, 1907	1,345	240,055.74	.....	.....
Survivors, act May 11, 1912	291,268	82,301,870.41	.....	.....
Invalids, general law, Civil War	22,430	7,998,357.00	13,646	4,951,002.00
Army nurses	161	23,184.00	50	9,036.00
Widows, etc., general law, Civil War	44,277	9,365,124.00	4,762	1,066,720.00
Invalids, act June 27, 1890	537	70,197.00	.....	.....
Minors, etc., act June 27, 1890	3,125	531,936.00	.....	.....
Widows, acts Apr. 19, 1908, and Sept. 8, 1916	236,725	45,744,864.00	.....	.....
Invalids, War with Spain	22,735	2,803,798.80	1,325	254,856.00
Widows, etc., War with Spain	3,870	592,800.00	345	75,372.00
Widows, War of 1812	100	19,680.00	9	2,400.00
Survivors, War with Mexico	359	128,064.00	25	9,924.00
Widows, War with Mexico	3,217	657,552.00	205	41,856.00
Survivors, Indian wars	508	118,944.00	56	10,464.00
Widows, Indian wars	1,676	241,728.00	67	12,144.00
Total	651,637	154,098,402.33	21,474	6,722,990.00

Total number of pensioners	673,111
Total annual value	$160,821,392.33
Average annual value of each pension:	
All classes	238.92
Regular Establishment	174.95
Act Feb. 6, 1907	178.48
Act May 11, 1912	282.56
General law, Civil War	274.70
Act June 27, 1890	164.43
Acts Apr. 19, 1908, and Sept. 8, 1916	193.24
War with Spain	131.80
Survivors, Civil War	290.26

EXHIBIT 4.—*Pensioners and amounts paid, arranged by States, Territories, insular possessions, Canal Zone, and foreign countries, during the fiscal year ended June 30, 1917.*

STATES AND TERRITORIES.	Number.	Amount.	STATES AND TERRITORIES—continued.	Number.	Amount.
Alabama	2,653	$634,146.59	New Hampshire	5,388	$1,287,893.64
Alaska	65	15,536.95	New Jersey	16,927	4,046,060.81
Arizona	735	175,687.05	New Mexico	1,558	372,408.74
Arkansas	7,234	1,729,143.02	New York	56,081	13,420,187.74
California	23,764	5,680,308.92	North Carolina	2,983	713,026.49
Colorado	6,621	1,582,617.63	North Dakota	2,407	575,345.21
Connecticut	8,217	1,964,109.51	Ohio	63,703	15,243,996.22
Delaware	2,136	510,568.08	Oklahoma	9,361	2,237,559.83
District of Columbia	7,381	1,764,280.43	Oregon	6,405	1,530,987.15
Florida	4,177	998,428.31	Pennsylvania	62,133	14,867,958.15
Georgia	2,460	588,013.80	Rhode Island	3,682	880,108.46
Idaho	1,842	440,293.26	South Carolina	1,392	332,729.76
Illinois	46,376	11,085,255.28	South Dakota	4,429	1,058,663.86
Indiana	41,041	9,810,030.23	Tennessee	13,926	3,328,731.78
Iowa	22,851	5,462,074.53	Texas	6,901	1,649,546.03
Kansas	26,599	6,357,958.97	Utah	843	201,502.29
Kentucky	17,537	4,191,869.11	Vermont	5,372	1,284,069.16
Louisiana	4,411	1,054,361.33	Virginia	7,153	1,709,781.59
Maine	11,714	2,799,997.42	Washington	8,178	1,954,787.34
Maryland	10,217	2,442,169.51	West Virginia	8,693	2,077,887.79
Massachusetts	28,021	6,697,859.63	Wisconsin	16,243	3,882,564.29
Michigan	28,165	6,732,279.95	Wyoming	691	165,169.73
Minnesota	10,434	2,494,039.02			
Mississippi	3,294	787,364.82			
Missouri	32,419	7,749,113.57	Total	668,884	159,931,864.11
Montana	1,945	464,913.35			
Nebraska	11,799	2,820,314.97	Canal Zone, total	1	144.00
Nevada	327	78,162.81			

EXHIBIT 4.—*Pensioners and amounts paid, arranged by States, Territories, insular possessions, Canal Zone, and foreign countries, during the fiscal year ended June 30, 1917*—Continued.

	Number.	Amount.
INSULAR POSSESSIONS.		
Guam	2	$528.00
Hawaii	62	14,564.15
Philippines	49	11,529.07
Porto Rico	27	6,512.92
Virgin Islands	1	144.00
Total	141	33,278.14
FOREIGN COUNTRIES.		
Algeria	1	144.00
Arabia	1	84.00
Argentina	9	2,151.27
Australia	79	18,883.37
Austria-Hungary	27	3,156.99
Azores	4	954.00
Bahamas	3	726.40
Barbados	1	144.00
Belgium	16	3,824.48
Bermuda	6	896.00
Bolivia	1	360.00
Borneo	1	168.00
Brazil	4	886.00
British West Indies	10	2,390.30
Bulgaria	2	324.00
Canada	2,119	506,504.57
Cape de Verde Islands	1	228.00
Chile	11	3,120.00
China	11	2,410.30
Colombia	2	288.00
Comoro Islands	1	120.00
Costa Rica	3	720.00
Cuba	35	8,366.05
Denmark	45	9,756.35
Dominican Republic	1	204.00
Dutch West Indies	4	1,068.00
East Africa	1	144.00
Egypt	1	144.00
England	386	92,265.58
Finland	7	1,673.21
France	54	12,907.62
Germany	371	39,340.06
Greece	8	1,512.24
Guadeloupe	1	240.00
Guatemala	2	564.00
Haiti	2	$720.00
Honduras	4	1,260.93
Hongkong	2	278.94
India	7	1,537.02
Ireland	330	76,879.90
Isle of Pines	4	920.16
Italy	55	17,146.65
Japan	39	9,322.17
Liberia	5	1,314.80
Malta	1	144.00
Mauritius	1	144.00
Mexico	32	7,648.96
Morocco	1	144.00
Netherlands	9	1,747.72
Newfoundland	6	1,320.81
New Zealand	15	5,585.45
Nicaragua	2	324.00
Norway	61	14,580.83
Panama	5	1,018.93
Peru	10	2,125.41
Poland	1	400.73
Portugal	3	708.00
Roumania	1	36.00
Russia	8	1,904.99
Samoa	1	96.00
Scotland	60	14,436.80
Servia	1	102.00
Seychelles Islands	1	144.00
Siam	1	180.00
South Africa	6	1,740.00
Spain	7	1,885.23
St. Helena	1	144.00
Sweden	77	19,946.59
Switzerland	56	17,385.68
Tasmania	2	636.00
Tonga Islands	1	216.00
Turkey in Asia	9	1,952.45
Turkey in Europe	2	396.00
Uruguay	1	360.00
Venezuela	1	288.00
Wales	25	5,975.75
Total	4,085	929,767.69

SUMMARY.

	Pensioners.	Payments.
Pensioners residing in States and Territories and payments to them	668,884	$159,931,864.11
Pensioners residing in Canal Zone and insular possessions and payments to them	142	33,422.14
Pensioners residing in foreign countries and payments to them	4,085	929,767.69
Total	673,111	160,895,053.94

EXHIBIT 5.—*Pensioners of the different wars on the roll at the close of each of the last 5 fiscal years.*

	1917	1916	1915	1914	1913
Civil War	618,326	654,007	691,606	728,129	762,439
War with Spain	28,275	28,472	28,912	28,910	29,015
War of 1812	109	115	134	170	199
War with Mexico	3,806	4,298	4,933	5,592	6,265
Indian wars	2,307	2,578	2,832	3,097	3,396
Regular Establishment	20,288	20,102	19,730	19,341	18,958
Total	673,111	709,572	748,147	785,239	820,272

EXHIBIT 6.—*Comparative table of disbursements of pensions on account of the different wars for the last 5 fiscal years (cents omitted).*

	1917	1916	1915	1914	1913
Civil War	$152,170,579	$150,431,753	$156,668,771	$163,377,552	$164,897,872
War with Spain	3,783,680	3,800,226	3,851,701	3,907,510	4,071,168
War of 1812	18,702	18,848	22,349	27,532	32,171
War with Mexico	842,055	803,281	925,847	1,060,530	1,184,700
Indian wars	413,997	475,072	513,706	560,247	527,664
Regular Establishment	3,666,041	3,625,910	3,535,892	3,475,147	3,447,142
Total	160,895,054	159,155,090	165,518,266	172,408,518	174,160,717

EXHIBIT 7.—*Comparative table of the value of an average pension of the different wars for the last 5 fiscal years.*

	1917	1916	1915	1914	1913
Civil War	$247.71	$230.01	$226.53	$224.38	$216.29
War with Spain	133.81	133.47	133.22	135.16	140.31
War of 1812	171.58	163.89	166.71	161.95	161.66
War with Mexico	221.24	186.89	187.68	189.65	189.09
Indian wars	179.44	184.27	181.39	180.89	155.37
Regular Establishment	180.69	180.37	179.21	179.67	181.83
Average for all wars	242.00	224.29	179.12	178.62	174.09

EXHIBIT 8.—*Comparative number of pensioners on the roll at the close of each of the last five fiscal years, classified as to the character of pension received.*

	1917	1916	1915	1914	1913
DISABILITY PENSIONS.					
Civil War	36,287	39,845	45,611	50,347	62,125
War with Spain	24,060	24,101	24,370	24,250	24,160
Regular Establishment	15,702	15,553	15,242	14,919	14,561
Total	76,049	79,499	85,223	89,516	100,846
AGE AND SERVICE PENSIONS.					
Act May 11, 1912	291,268	320,276	347,081	369,624	379,064
Act Feb. 6, 1907	1,345	1,727	2,872	7,158	16,241
Act June 27, 1890	537	681	1,081	2,225	5,274
War with Mexico	384	513	680	893	1,142
Indian wars	564	676	786	915	1,066
Total	294,098	323,873	352,500	380,815	402,787
DEPENDENTS.					
Civil War:					
General law	49,039	52,217	56,020	59,160	62,519
Act June 27, 1890	3,125	3,725	3,854	4,091	4,280
Act Apr. 19, 1908	236,725	235,536	235,087	235,524	232,864
Total	288,889	291,478	294,961	298,775	299,663
War with Spain	4,215	4,371	4,542	4,660	4,855
War of 1812	109	115	134	170	199
War with Mexico	3,422	3,785	4,253	4,699	5,123
Indian wars	1,743	1,902	2,046	2,182	2,330
Regular Establishment	4,586	4,549	4,488	4,422	4,397
Total	302,964	306,200	310,424	314,908	316,567
Grand total	673,111	709,572	748,147	785,239	820,200

EXHIBIT 9.—*Comparative disbursements during each of the last five years, classified as to the character of pension received.*

	1917	1916	1915	1914	1913
DISABILITY PENSIONS.					
Civil War	$13,444,481.48	$14,879,204.29	$16,562,903.96	$18,714,955.82	$25,825,094.29
War with Spain	3,087,058.10	3,076,733.88	3,105,807.74	3,132,372.53	3,240,844.86
Regular Establishment	2,744,567.08	2,711,946.09	2,631,955.22	2,581,190.51	2,560,379.27
Total	19,276,106.66	20,667,884.26	22,300,666.92	24,428,518.86	31,626,318.42
AGE AND SERVICE PENSIONS.					
Act of May 11, 1912	85,762,419.32	91,282,255.72	94,780,059.68	97,506,549.73	53,306,021.92
Act of Feb. 6, 1907	286,881.16	401,588.66	979,813.51	2,000,203.23	36,376,470.53
Act of June 27, 1890	87,968.85	123,573.85	248,228.23	512,901.47	4,415,947.96
War with Mexico	158,134.59	213,118.76	277,029.20	354,799.79	411,416.25
Indian wars	143,099.07	173,415.46	199,772.96	225,664.88	176,292.72
Total	86,438,502.99	92,193,952.45	96,484,903.58	100,600,119.10	94,686,149.48
DEPENDENTS.					
Civil War:					
General law	9,744,503.83	8,443,232.44	8,965,970.28	9,463,517.57	10,017,900.81
Act of June 27, 1890	651,779.91	755,514.49	776,115.84	838,425.86	876,140.21
Act of Apr. 19, 1908	42,192,544.02	34,546,384.04	34,355,679.93	34,340,997.85	34,080,296.76
Total	52,588,827.76	43,745,130.97	44,097,766.05	44,642,941.28	44,974,337.78
War with Spain	696,621.84	723,491.83	745,893.73	775,137.00	830,323.56
War of 1812	18,701.94	18,848.00	22,348.90	27,532.40	32,171.07
War with Mexico	683,920.80	590,161.78	648,817.40	705,729.95	773,283.55
Indian wars	270,898.31	301,656.48	313,933.22	334,582.52	351,371.38
Regular Establishment	921,473.64	913,964.15	903,936.34	893,957.18	886,762.61
Total	55,180,444.29	46,293,253.21	46,732,695.64	47,379,880.33	47,848,249.95
Grand total	160,895,053.94	159,155,089.92	165,518,266.14	172,408,518.29	174,160,717.85

EXHIBIT 10.—*Amount paid to pensioners, 1790 to 1917, inclusive.*

War of the Revolution	$70,000,000.00
War of 1812	46,010,445.70
Indian wars	14,204,296.51
War with Mexico	51,264,284.61
Civil War	4,917,245,599.49
War with Spain and Philippine insurrection	57,528,347.49
Regular Establishment	42,764,359.73
Unclassified	16,508,447.41
Total	5,215,525,780.94

EXHIBIT 11.—*Disbursements for pensions and for maintenance of pension system, 1866 to 1917.*

Fiscal year.	Paid as pensions.	Cost, maintenance, and expenses.	Total.	Number of pensioners.
1866	$15,450,549.88	$407,165.00	$15,857,714.88	126,722
1867	20,784,789.69	490,977.35	21,275,767.04	155,474
1868	23,101,509.36	553,020.34	23,654,529.70	169,643
1869	28,513,247.27	564,526.81	29,077,774.08	187,963
1870	29,351,488.78	600,997.86	29,952,486.64	198,686
1871	28,518,792.62	863,079.00	29,381,871.62	207,495
1872	29,752,746.81	951,253.00	30,703,999.81	232,229
1873	26,982,063.89	1,003,200.64	27,985,264.53	238,411
1874	30,206,778.99	966,794.13	31,173,573.12	236,241
1875	29,270,404.76	982,695.35	30,253,100.11	234,821
1876	27,936,209.53	1,015,078.81	28,951,288.34	232,137
1877	28,182,821.72	1,034,459.33	29,217,281.05	232,104
1878	26,786,009.44	1,032,500.09	27,818,509.53	225,998
1879	33,664,428.92	837,734.14	34,502,163.06	242,755
1880	56,689,229.08	935,027.28	57,624,256.36	250,802
1881	50,583,105.35	1,072,059.64	51,655,464.99	268,830
1882	54,313,172.05	1,466,236.01	55,779,408.06	285,697
1883	60,427,573.81	2,591,648.29	63,019,222.10	303,658
1884	57,912,387.47	2,835,181.00	60,747,568.47	322,756
1885	65,171,937.12	3,392,576.34	68,564,513.46	345,125
1886	64,091,142.90	3,245,016.61	67,336,159.51	365,783

EXHIBIT 11.—*Disbursements for pensions and for maintenance of pension system, 1866 to 1917*—Continued.

Fiscal year.	Paid as pensions.	Cost, maintenance, and expenses.	Total.	Number of pensioners.
1887	$73,752,997.08	$3,753,400.91	$77,506,397.99	406,007
1888	78,950,501.67	3,515,057.27	82,465,558.94	452,557
1889	88,842,720.58	3,466,968.40	92,309,688.98	489,725
1890	106,093,850.39	3,526,382.13	109,620,232.52	537,944
1891	117,312,690.50	4,700,636.44	122,013,326.94	676,160
1892	139,394,147.11	4,898,665.80	144,292,812.91	876,068
1893	156,906,637.94	4,867,734.42	161,774,372.36	966,012
1894	139,986,726.17	3,963,976.31	143,950,702.48	969,544
1895	139,812,294.30	4,338,020.21	144,150,314.51	970,524
1896	138,220,704.46	3,991,375.61	142,212,080.07	970,678
1897	139,949,717.35	3,987,783.07	143,937,500.42	976,014
1898	144,651,879.80	4,114,091.46	148,765,971.26	993,714
1899	138,355,052.95	4,147,517.73	142,502,570.68	991,519
1900	138,462,130.65	3,841,706.74	142,303,887.39	993,592
1901	138,531,483.84	3,868,795.44	142,400,279.28	997,735
1902	137,504,267.99	3,831,378.96	141,335,646.95	999,446
1903	137,759,653.71	3,993,216.79	141,752,870.50	996,545
1904	141,093,571.49	3,849,366.25	144,942,937.74	994,762
1905	141,142,861.33	3,721,832.82	144,864,694.15	998,441
1906	139,000,288.25	3,523,269.51	142,523,557.76	985,971
1907	138,155,412.46	3,309,110.44	141,464,522.90	967,371
1908	153,093,086.27	2,800,963.36	155,894,049.63	951,687
1909	161,973,703.77	2,852,583.73	164,826,287.50	946,194
1910	159,974,056.08	2,657,673.86	162,631,729.94	921,083
1911	157,325,160.35	2,517,127.06	159,842,287.41	892,098
1912	152,986,433.72	2,448,857.31	155,435,291.03	860,294
1913	174,171,660.80	2,543,246.59	176,714,907.39	820,200
1914	172,417,546.26	2,066,507.15	174,484,053.41	785,239
1915	165,518,266.14	1,779,860.30	167,298,126.44	748,147
1916	159,155,089.92	1,656,722.33	160,811,812.25	709,572
1917	160,895,053.94	1,562,854.96	162,457,908.90	673,111
Total	5,119,080,336.71	132,937,910.38	5,252,018,247.09	.....

EXHIBIT 12.—*Loss and percentage of loss by death of Civil War soldiers, 1910 to 1917.*

Year.	On roll at beginning of year.	Loss by death during year.	Percentage of loss.
1910	593,961	35,312	5.9
1911	562,615	35,243	6.2
1912	529,884	33,981	6.3
1913	497,263	36,064	7.2
1914	462,379	33,639	7.3
1915	429,354	33,255	7.7
1916	396,370	34,252	8.6
1917	362,277	33,232	9.2

EXHIBIT 13.—*Comparative table of losses and gains to the roll for the last 5 years classified by causes.*

	1917	1916	1915	1914	1913
Losses:					
By death	54,526	55,463	52,329	52,583	57,459
By remarriage	549	740	608	751	888
Minors attaining age of 16 years	545	623	715	773	983
Failure to claim for 3 years	258	702	627	248	202
Other causes	353	266	201	226	320
Total	56,231	57,794	54,480	54,581	59,852
Gains:					
By original allowance	18,496	18,929	17,064	19,198	19,276
Restoration and renewal	1,274	290	324	350	482
Total	19,770	19,219	17,388	19,548	19,758
Net loss	36,461	38,575	37,092	35,033	40,094

EXHIBIT 14.—*Comparative table of loses and gains to the rolls for the last 5 fiscal years, classified by wars.*

	1917				1916				1915				1914				1913			
	Losses.	Gains.	Net loss.	Net gain.	Losses.	Gains.	Net loss.	Net gain.	Losses.	Gains.	Net loss.	Net gain.	Losses.	Gains.	Net loss.	Net gain.	Losses.	Gains.	Net loss.	Net gain.
Regular Establishment:																				
Army invalids	457	538	.....	81	454	524	.....	70	386	556	.....	170	413	572	.....	159	607	613	.....	6
Army dependents	255	294	.....	39	179	184	.....	5	163	201	.....	38	174	174	.....	.....	153	203	.....	50
Navy invalids	190	258	.....	68	212	453	.....	241	168	336	.....	168	201	400	.....	199	230	412	.....	182
Navy dependents	120	118	2	.....	75	131	.....	56	84	110	.....	26	77	102	.....	25	95	102	.....	7
Civil War:																				
Act May 11, 1912—																				
Army	29,681	1,702	27,979	.....	29,257	3,342	25,915	.....	27,151	445	26,706	.....	26,843	17,857	8,986	.....	14,912	369,298	.....	354,386
Navy	1,080	51	1,029	.....	1,044	154	890	.....	1,027	46	981	.....	1,052	598	454	.....	544	11,976	.....	11,432
Act Feb. 6, 1907—																				
Army	389	27	362	.....	1,088	25	1,063	.....	768	43	725	.....	8,863	145	8,718	.....	306,873	605	306,268	.....
Navy	22	2	20	.....	86	4	82	.....	47	3	44	.....	408	43	365	.....	11,128	58	11,070	.....
General law—																				
Army invalids	5,162	1,677	3,485	.....	6,260	583	5,677	.....	4,325	27	4,298	.....	11,719	370	11,349	.....	43,462	2,339	41,123	.....
Army nurses	41	.....	41	.....	23	.....	23	.....	20	3	17	.....	34	1	33	.....	39	2	37	.....
Army dependents	4,284	1,145	3,139	.....	4,646	879	3,767	.....	4,293	894	3,399	.....	4,458	780	3,678	.....	5,641	1,253	4,388	.....
Navy invalids	71	39	32	.....	79	13	66	.....	61	3	58	.....	112	8	104	.....	376	62	314	.....
Navy dependents	74	35	39	.....	53	17	36	.....	71	24	47	.....	54	9	45	.....	76	36	40	.....
Act June 27, 1890—																				
Army invalids	150	12	138	.....	371	10	361	.....	181	14	167	.....	2,900	41	2,859	.....	40,810	87	40,723	.....
Army dependents	847	261	586	.....	571	445	126	.....	612	394	218	.....	657	473	184	.....	700	509	191	.....
Navy invalids	6	.....	6	.....	39	.....	39	.....	24	1	23	.....	193	3	190	.....	1,216	12	1,204	.....
Navy dependents	41	27	14	.....	20	17	3	.....	31	11	20	.....	27	22	5	.....	22	14	8	.....
Act Apr. 19, 1908—																				
Army widows	15,369	16,631	.....	1,262	15,052	15,518	.....	466	12,812	13,079	.....	267	12,488	15,166	.....	2,678	13,778	13,842	.....	64
Navy widows	626	553	73	.....	536	519	17	.....	515	412	103	.....	493	475	18	.....	635	488	147	.....
War with Spain:																				
Army invalids	502	462	40	.....	387	123	264	.....	342	467	.....	125	290	383	.....	93	495	814	.....	319
Army nurses	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	3
Army dependents	272	127	145	.....	268	105	163	.....	264	154	110	.....	320	137	183	.....	330	182	148	.....
Navy invalids	11	10	1	.....	12	7	5	.....	16	12	4	.....	17	14	3	.....	30	27	3	.....
Navy dependents	16	5	11	.....	15	7	8	.....	14	7	7	.....	17	5	12	.....	15	9	6	.....
War of 1812:																				
Widows	9	3	6	.....	19	.....	19	.....	36	.....	36	.....	29	.....	29	.....	39	.....	39	.....
War with Mexico:																				
Survivors	134	5	129	.....	168	1	167	.....	212	.....	212	.....	256	7	249	.....	285	114	171	.....
Widows	408	45	363	.....	544	76	468	.....	520	74	446	.....	509	85	424	.....	526	116	410	.....
Indian wars:																				
Survivors	114	2	112	.....	114	4	110	.....	135	6	129	.....	159	8	151	.....	154	10	144	.....
Widows	201	42	159	.....	205	61	144	.....	202	66	136	.....	209	61	148	.....	185	76	109	.....
Total	60,532	24,071	36,461	.....	61,777	23,202	38,575	.....	54,480	17,388	37,092	.....	72,972	37,939	35,033	.....	443,356	403,262	40,094	.....

EXHIBIT 15.—*Appropriations for pensions and disbursements on account thereof for the fiscal year ended June 30, 1917, and unexpended balances at close of year.*

	Pensions.			Fees of examining surgeons, pensions.
	Army.	Navy.	Total.	
APPROPRIATIONS.				
Act of June 30, 1916	$152,100,000.00	$5,900,000.00	158,000,000.00	$65,000.00
Deficiency act of Apr. 17, 1917	4,800,000.00	200,000.00	5,000,000.00	.....
Repayments to the appropriations	67,420.00	2,490.37	69,910.57	.....
Total to be accounted for	156,967,420.20	6,102,490.37	163,069,910.57	65,000.00
DISBURSEMENTS.				
Amount disbursed by disbursing clerk, Bureau of Pensions	155,163,588.83	5,731,465.11	160,895,053.94	.....
Amount disbursed by chief disbursing clerk, Department of the Interior	.....	.....	.....	35,620.38
Amount disbursed by Treasury settlements	.....	.....	.....	6.50
Total amount disbursed	155,163,588.83	5,731,465.11	160,895,053.94	35,626.88
BALANCES JUNE 30, 1917.				
Balance deposited by disbursing clerk, Bureau of Pensions	1,053,831.37	131,025.26	1,184,856.63	.....
Remaining in the United States Treasury	750,000.00	240,000.00	990,000.00	29,373.12
Available balance	1,803,831.37	371,025.26	2,174,856.63	29,373.12
Total accounted for	156,967,420.20	6,102,490.37	163,069,910.57	65,000.00

In addition to the above there were disbursed during the fiscal year ended June 30, 1917, the following sums chargeable to the appropriation for the fiscal year ended June 30, 1916

Fees of examining surgeons, pensions, by chief disbursing clerk, Department of the Interior	$19,110.18
Fees of examining surgeons, pensions, by Treasury settlements	187.50
Total	19,297.68

Of the amount $5,731,465.11, disbursed for Navy pensions, $558,608.04 was paid from the Navy pension fund.

EXHIBIT 16.—*Number and amounts of first payments in original, increase, restoration, and other cases made during the fiscal year ended June 30, 1917.*

Class.	Original.		Increase and reissue.		Supplemental.		Restoration and renewal.		Total.	
	Number.	Amount.	Number.	Amount.	Number.	Amount.	Number.	Amount.	Number.	Amount.
Regular Establishment:										
Army—										
Invalids	519	$55,412.13	317	$13,464.68			7	$835.20	843	$69,712.01
Widows, etc	184	34,035.84	106	2,536.75					290	36,572.59
Navy—										
Invalids	299	25,982.88	128	5,613.12			39	785.16	466	32,381.16
Widows, etc	98	13,390.60	21	708.46					119	14,099.06
Civil War:										
Act Feb. 6, 1907—										
Army	9	5,667.77	7	2,228.27			7	4,422.80	23	12,318.84
Navy	3	2,166.60			1	$36.00	1	1,345.00	5	3,547.60
Act May 11, 1912—										
Army	263	54,663.34	47,094	2,474,837.82	15	419.72	199	15,554.50	47,571	2,545,475.38
Navy	24	7,663.70	1,540	83,667.54	1	16.80			1,565	91,348.04
General law—										
Army—										
Invalids	25	1,064.70	2,943	138,915.55			32	1,461.48	3,000	141,441.73
Nurses			2	79.60			1	50.33	3	129.93
Widows, etc	508	51,246.68	29,005	837,251.34	2	$8.93	173	14,114.04	29,688	902,700.99
Navy—										
Invalids			50	3,193.59			1	22.97	51	3,216.56
Widows, etc	9	293.60	319	9,381.50			5	430.63	333	10,105.73
Act June 27, 1890—										
Army—										
Invalids	8	5,837.80	2	1,364.53	3	2,770.80	4	3,749.73	17	13,722.86
Minors, etc	277	72,402.42	2	59.33			6	1,191.81	285	73,653.56
Navy—										
Invalids					1	756.60			1	756.60
Minors, etc	10	2,071.00							10	2,071.00
Acts Apr. 19, 1908, and Sept. 8, 1916—										
Army widows	15,477	945,146.11	109,397	3,358,075.30	1	720.27	683	41,142.83	125,558	4,345,084.51
Navy widows	448	41,687.25	3,717	112,370.79			30	2,070.46	4,195	156,128.50
War with Spain:										
Army—										
Invalids	427	46,378.12	408	15,042.32			32	4,219.90	867	65,640.34
Widows, etc	116	18,603.01	8	294.31			2	72.40	126	18,969.72
Navy—										
Invalids	9	2,012.67	7	450.54					16	2,463.21
Widows, etc	6	216.80							6	216.80

EXHIBIT 16.—*Number and amounts of first payments in original, increase, restoration, and other cases made during the fiscal year ended June 30, 1917*—Continued.

Class.	Original.		Increase and reissue.		Supplemental.		Restoration and renewal.		Total.	
	Number.	Amount.	Number.	Amount.	Number.	Amount.	Number.	Amount.	Number.	Amount.
War of 1812:										
Widows			79	$1,816.47					79	$1,816.47
War with Mexico:										
Survivors	5	$502.33	179	10,752.37					184	11,254.70
Widows	37	15,729.92	1,893	48,111.64			2	$96.00	1,932	63,937.56
Indian wars:										
Survivors	5	2,477.94	3	373.60					8	2,851.54
Widows	39	5,721.47	20	772.57					59	6,494.04
Total	18,805	1,410,374.68	197,247	7,121,361.99	24	$4,809.12	1,224	91,565.24	217,300	8,628,111.03

AVERAGE VALUE OF FIRST PAYMENTS, 1917.

In original cases	$74.99
In original Regular Establishment cases	117.11
In original act Feb. 6, 1907, cases	652.86
In original act May 11, 1912, cases	217.17
In original general law, Civil War, cases	97.05
In original act June 27, 1890, cases	272.24
In original acts Apr. 19, 1908, and Sept. 8, 1916, cases	61.97
In original War with Spain cases	120.45
In original War with Mexico cases	386.48
In original Indian war cases	186.35
In increase and reissue cases	36.10
In all cases	39.70

EXHIBIT 17.—*Number of inmates of the United States Soldiers' Home, St. Elizabeths Hospital and the various branches of the National Home for Disabled Volunteer Soldiers, and the amount paid such inmates from July 1, 1916, to June 30, 1917.*

Institution and location.	July 1, 1916, to Sept. 30, 1916.		Oct. 1, 1916, to Dec. 31, 1916.		Jan. 1, 1917, to Mar. 31, 1917.		Apr. 1, 1917, to June 30, 1917.		Total.
	Number.	Amount.	Number.	Amount.	Number.	Amount.	Number.	Amount.	
United States Soldiers' Home, Washington, D. C	977	$55,691.55	964	$58,590.05	968	$57,079.61	907	$53,142.41	$224,503.62
St. Elizabeths Hospital, Washington, D. C	318	20,489.42	318	19,406.46	294	19,002.07	285	17,420.93	76,318.88
Battle Mountain Sanitarium, Hot Springs, S. Dak	382	24,832.67	413	26,828.88	430	29,439.54	385	26,720.87	107,821.96
Central Branch, National Military Home, Ohio	2,880	185,651.77	2,895	183,834.13	2,907	186,272.49	2,774	180,344.28	736,102.67
Danville Branch, National Home, Danville, Ill	1,834	117,554.01	1,864	119,197.17	1,905	123,543.91	1,808	118,301.48	478,596.57
Eastern Branch, National Soldiers' Home, Me	1,159	75,775.51	1,123	74,342.02	1,105	73,253.78	1,059	70,926.28	294,297.59
Marion Branch, National Military Home, Ind	1,367	88,036.87	1,426	90,840.38	1,435	92,826.95	1,339	87,205.86	358,910.06
Mountain Branch, National Soldiers' Home, Tenn	1,147	72,441.12	1,213	77,088.50	1,297	82,342.39	1,174	76,811.82	308,683.83
Northwestern Branch, National Home, Wis	1,291	82,578.88	1,303	83,961.17	1,323	86,209.17	1,219	80,579.97	333,329.19
Pacific Branch, Soldiers' Home, Cal	3,008	200,019.18	2,933	197,148.84	3,230	217,511.28	3,008	204,383.13	819,062.43
Southern Branch, National Soldiers' Home, Va	1,918	121,963.28	1,944	124,632.50	1,972	127,570.33	1,800	118,241.09	492,407.20
Western Branch, National Military Home, Kans	2,387	154,080.78	2,418	156,237.79	2,475	160,125.58	2,215.	146,125.48	616,569.63
Total	18,668	1,199,115.04	18,814	1,212,107.89	19,341	1,255,177.10	17,973	1,180,203.60	4,846,603.63

Total amount of attorney fees paid in cases where the pensioners were inmates of the above homes during the fiscal year ended June 30, 1917, was $843, making the entire disbursement on account of homes $4,847,446.63.

EXHIBIT 18.—*Certificates issued during the fiscal year ended June 30, 1917.*

Classes.	Original.	Increase.	Reissue.	Restoration.	Renewal.	Supplemental.	Total.
General law:							
Army—							
Invalids	24	875	1,682	.....	54	.....	2,635
Nurses	.....	1	.....	.....	.....	.....	1
Widows, etc	442	133	488	2	155	2	1,222
Navy—							
Invalids	1	12	33	.....	4	.....	50
Widows, etc	7	4	18	1	1	.....	31
War with Spain, Army—							
Invalids	427	400	32	6	21	.....	886
Widows, etc	120	8	.....	.....	3	.....	131
War with Spain, Navy—							
Invalids	9	6	1	1	.....	.....	17
Widows, etc	6	.....	.....	.....	.....	.....	6
Regular Establishment, Army—							
Invalids	518	347	32	1	9	.....	907
Widows, etc	187	20	10	.....	.....	.....	217
Regular Establishment, Navy—							
Invalids [1]	271	119	21	16	34	.....	461
Widows, etc	96	6	2	.....	.....	.....	104
Act of June 27, 1890:							
Army—							
Invalids	11	1	.....	3	.....	5	20
Widows, etc	279	1	4	2	3	1	290
Navy—							
Invalids	.....	.....	1	.....	.....	2	3
Widows, etc	12	.....	.....	.....	.....	.....	12
Act of Feb. 6, 1907:							
Army, Civil War	13	2	6	8	1	6	36
Navy, Civil War	3	.....	2	.....	.....	1	6
Mexican War, survivors	.....	.....	.....	.....	.....	.....	.....
Act of Apr. 19, 1908:							
Army, widows	7,021	1	14	4	28	.....	7,068
Navy, widows	206	.....	.....	.....	.....	.....	206
Act of May 11, 1912:							
Army, Civil War	208	18,866	2,137	1	35	48	21,295
Navy, Civil War	19	727	48	.....	.....	1	795
Mexican War, survivors	.....	.....	1	.....	.....	.....	1
Act of Apr. 19, 1908, amended by act of Sept. 8, 1916:							
Army, widows	8,146	.....	6	.....	7	.....	8,159
Navy, widows	279	.....	.....	.....	.....	.....	279
Act of Sept. 8, 1916, sec. 2:							
Army, former widows	425	.....	3	.....	958	.....	1,386
Navy, former widows	4	.....	.....	.....	39	.....	43
Act of Jan. 29, 1887, etc.:							
Mexican War—							
Survivors	2	6	3	.....	.....	.....	11
Widows	41	36	.....	.....	2	.....	79
Act of July 27, 1892, etc.:							
Indian wars—							
Survivors	1	4	.....	.....	.....	.....	5
Widows	46	21	.....	.....	.....	.....	67
Old wars:							
Invalids	.....	2	.....	.....	.....	.....	2
Widows	1	1	1	.....	.....	.....	3
War of 1812, widows	.....	4	.....	.....	1	.....	5
Total	18,825	21,603	4,545	45	1,355	66	46,439
Reissues in lieu of lost certificates	.....	.....	.....	.....	.....	.....	2,068
Accrued pension orders	.....	.....	.....	.....	.....	.....	11,375
Widows' increase orders, act Sept. 8, 1916	.....	.....	.....	.....	.....	.....	157,363
Grand total	.....	.....	.....	.....	.....	.....	217,245

[1] 29 concurrent originals.

Medal of honor roll, act Apr. 27, 1916, 351.

EXHIBIT 19.—*Statement showing, by classes, the different monthly rates paid to pensioners under the general pension laws and the number at each rate on the rolls June 30, 1917.*

Rate.	Regular Establishment.		Civil War.							War with Spain.	
	Invalids.	Widows, etc.	Act May 11, 1912.	Act Feb. 6, 1907.	General law.		Act June 27, 1890.		Acts Apr. 19, 1908, and Sept. 8, 1916.	Invalids.	Widows, etc.
					Invalids.	Widows, etc.	Invalids.	Minors, etc.	Widows.		
$2.00	3	[1] 1									[1] 1
2.50	1										
3.00	7										
4.00	7										
5.00	7										
6.00	4,237				230		30			9,342	
6.25										5	
7.50	15				3					28	
8.00	2,221				120		77	5		4,098	
8.50	1				1					32	
9.00	2										
9.50	1										
10.00	1,551				111		57			2,740	
10.50	1										
11.00	2										
11.25					1					24	
11.50	2										
12.00	1,725	3,217		759	224	13,388	372	3,120	115,779	2,265	3,663
12.50	14				1					10	
12.75	1				3					40	
13.00	1		298		4						
13.50			666								
14.00	664		407		219					901	
14.50			298							1	
15.00	38	52	4,053	169	12	249				74	26
15.50			6,595								
15.68	1										
16.00	86		3,804		136					35	
16.50			2,810							1	
16.68	1										
17.00	1,780	104	1,231		1,969	403				1,585	54
17.50	4										
17.86	1										
18.00	15		16,854		1					2	
18.18	1										
18.50	3										
18.75			1		1					2	
19.00	2		30,811								
19.18	2										
19.50	3										
19.75							1				
19.84½	1										
20.00	74	332	20,157	416	268	29,787			120,946	119	74
20.36	1										
20.50	3										
20.68	3										
21.00			10,244								
21.25	16									3	
21.50			18,280								
21.68	1										
22.00	64				271					57	
22.50	2		20,377							3	
22.59½	1										
22.68	1										
22.94½	1										
23.00	1		10,416								
23.14½	1										
23.49½	1										
23.50			1								
23.54	1										
23.86	1										
24.00	972		33,668		6,775					616	
24.18	1										
24.50			1								

[1] Additional pension to child by former marriage.

EXHIBIT 19.—*Statement showing, by classes, the different monthly rates paid to pensioners under the general pension laws and the number at each rate on the rolls June 30, 1917*—Continued.

Rate.	Regular Establishment.		Civil War.							War with Spain.	
	Invalids.	Widows, etc.	Act May 11, 1912.	Act Feb. 6, 1907.	General law.		Act June 27, 1890.		Acts Apr. 19, 1908, and Sept. 8, 1916.	Invalids.	Widows, etc.
					Invalids.	Widows, etc.	Invalids.	Minors, etc.	Widows.		
$24.99	1										
25.00	66	132	28,458		469	255				21	32
25.14½	1										
25.50	1		2								
25.69½	1										
26.00	4									1	
26.24½	1										
26.36	1										
26.64	2										
26.99½	1										
27.00	27		10,183		368					19	
27.19	1										
27.36	1										
27.50	3									1	
27.89½	1										
28.00	2		1			1					
28.25	3										
28.29	3										
28.50	1										
28.64½	1										
28.68	1										
28.69½	1										
29.00			5							1	
29.18	2									1	
29.36	1										
29.39	1										
29.84½	1										
29.84	1										
30.00	851	242	71,426		7,094	165				407	
30.50	1										20
30.68	1										
31.00	3		1								
31.04	1										
31.18	1										
31.24	1										
31.25			1								
31.50	1		7								
31.68			1								
32.00	2					28					
32.18										1	
32.36	1										
32.50	2		3								
32.94½	1										
33.00	3		4								
33.75	2										
34.00	2		32		2						
34.18	1										
34.25	2										
34.50	3										
34.64½	1										
34.86	1										
35.00			49								
35.50	2										
35.68	1										
36.00	9				5						
36.18	1										
36.50	1										
36.59½	1										
36.64½	1										
37.00			4								
37.18										1	
37.19½	1										
37.36	1										
37.50	11										
37.68	2										

EXHIBIT 19.—*Statement showing, by classes, the different monthly rates paid to pensioners under the general pension laws and the number at each rate on the rolls June 30, 1917*—Continued.

Rate.	Regular Establishment.		Civil War.							War with Spain.	
	Invalids.	Widows, etc.	Act May 11, 1912.	Act Feb. 6, 1907.	General law.		Act June 27, 1890.		Acts Apr. 19, 1908, and Sept. 8, 1916.	Invalids.	Widows, etc.
					Invalids.	Widows. etc.	Invalids.	Minors, etc.	Widows.		
$37.86	1										
37.94	1										
38.00	1										
38.14	1										
38.19	1										
38.36	1										
38.49	1										
39.00			2								
39.25	1										
39.75	1										
39.99½	1										
40.00	185		109		1,450					93	
40.44½	1										
40.50	1		1								
40.54½	1										
40.68	1										
40.74½	1										
40.99½	1										
41.00	3		2								
41.64½				1							
41.68	1										
41.79	1										
42.09½	1										
42.50			1								
42.89½	1										
43.50	1		1								
43.69	1										
44.00	3					1					
44.36	1										
44.50			1								
44.59	1										
44.86	1										
45.09½	1										
45.14½	2										
45.89	3										
46.00	100				751					55	
46.44	4										
46.50	2										
46.79½	1										
47.00	1										
47.54	1										
48.00	3		1		1						
48.59	1										
48.78	1										
48.84	1										
48.86										1	
50.00	95				579					66	
50.25	1										
50.35	1										
52.00	2										
52.09½	1										
52.44	1										
52.50			1								
52.59½	2										
53.54	2										
53.64½	1										
54.00	2										
55.00	37				836					27	
55.19	1										
56.89	1										
56.00	1				2						
56.99	1										
57.50	1										
57.89	2										
58.00	1										

EXHIBIT 19.—*Statement showing, by classes, the different monthly rates paid to pensioners under the general pension laws and the number at each rate on the rolls June 30, 1917*—Continued.

Rate.	Regular Establishment.		Civil War.							War with Spain.	
	Invalids.	Widows, etc.	Act May 11, 1912.	Act Feb. 6, 1907.	General law.		Act June 27, 1890.		Acts Apr. 19 1908, and Sept. 8, 1916.	Invalids.	Widows, etc.
					Invalids.	Widows, etc.	Invalids.	Minors, etc.	Widows.		
$58.44	2										
58.99	1										
59.00	1				1						
60.00	2				3						
60.44	2										
60.49½	1										
61.04½	1										
61.44	1										
62.14½	1										
62.36	1										
62.69½	1										
62.86	1										
63.00	1										
63.44	2										
64.50	1										
65.00					1						
70.00					1						
71.89½	1										
72.00	74				251					46	
74.04½	1										
74.09½	1										
80.00	2										
81.44	1										
82.00					1						
82.50	2										
100.00	44				265					4	
108.00										6	
117.14½	1									1	
Total	15,224	4,080	291,268	1,345	22,430	44,277	537	3,125	236,725	22,735	3,870

In addition to the above there were at the close of the year:
Army nurses, 161 at $12.
War of 1812 widows, 45 at $12; 55 at $20.
War with Mexico: Survivors—1 at $12; 8 at $20; 350 at $30; Widows—1,193 at $12; 2,024 at $20.
Indian wars: Survivors—29 at $15; 4 at $16; 475 at $20. Widows—1,672 at $12; 4 at $20.

EXHIBIT 20.—*Statement showing, by classes, the different monthly rates paid to pensioners under special acts of Congress and the number at each rate on the roll June 30, 1917.*

Rate.	Regular Establishment.		Civil War.			War with Spain.		War of 1812.	War with Mexico.		Indian wars.	
	Invalids.	Widows, etc.	Invalids.	Nurses.	Widows, etc.	Invalids.	Widows. etc.	Widows.	Survivors.	Widows,	Survivors.	Widows.
$6.00	5		5			18	1					
7.50						1						
8.00	9		13		6	44	1			1	10	
10.00	9		10		2	43						
12.00	195	148	214	37	1,551	705	232		1	90	1	41
12.50						1						
14.00	5		8		4	9						
15.00	5	3	11		42	31	2		1			
15.50			1									
16.00	9		2		44	15				1	40	
17.00	44	6	21		76	157	6					
17.50			1									
18.00	4	1	6		42	5	1					
20.00	33	32	231	4	2,305	65	24	4	4	104	2	26
21.00			23									
22.00		1	1			2						
22.50			7									
24.00	66	7	3,899	7	266	96	1	5		1		
25.00		46	12	1	103	3	26			1		
27.00			70		27							
28.00					1							
30.00	57	81	5,959		187	94	18		9	3	2	
32.00					16							
34.00			5									
35.00	1	33			13		6			1		
36.00	3		1,309	1	7	4						
40.00	14	69	1,103		18	7	12		5	2	1	
42.00					1							
44.00					1							
45.00	1	1	17		1							
46.00	2		13			4						
50.00	14	67	651		37	18	14		5	1		
55.00			15			1						
60.00	1	1	6									
65.00			5									
67.00			1									
72.00	1		16		1	1						
75.00		1			3		1					
100.00		7	11		6	1						
125.00		1										
166.66⅔					1							
208.33⅓		1										
416.66⅔					1							
Total...	478	506	13,646	50	4,762	1,325	345	9	25	205	56	67

EXHIBIT 21.—*Total number of certificates issued on account of all claims allowed since the establishment of the pension system (to include June 30, 1917).*

Original soldiers' and sailors' claims allowed:			
Revolutionary War			52,504
War of 1812			25,723
Mexican War			20,668
Indian wars			6,450
Old war, prior to Mar. 4, 1861			9,486
Army, since Mar. 4, 1861 (exclusive of War with Spain)			1,135,682
Navy, since Mar. 4, 1861 (exclusive of War with Spain)			44,482
War with Spain—			
Army	30,539		
Navy	1,088		
			31,627
Total			1,326,622
Reissue and increase claims allowed:			
Revolutionary War		2,992	
Mexican War (approximated)		20,689	
Indian wars (approximated)		640	
Army (approximated and exclusive of War with Spain)		3,627,442	
Navy (approximated and exclusive of War with Spain)		131,170	
War with Spain—			
Army	15,350		
Navy	432		
		15,782	
			3,798,715
Total			5,125,337

Original widows' claims allowed:			
Revolutionary War widows			22,644
Revolutionary War daughters (special acts)			18
War of 1812			35,520
Mexican War			16,211
Indian wars			8,350
Old war, prior to Mar. 4, 1861			8,039
Army, since Mar. 4, 1861 (exclusive of War with Spain)			815,199
Navy, since Mar. 4, 1861 (exclusive of War with Spain)			25,729
War with Spain—			
Army	7,597		
Navy	429		
			8,026
Total			939,736
Reissue and increase claims allowed:			
Widows—			
War with Spain (Navy, 27; Army, 218)		245	
All other acts (approximated)		65,704	
			65,949
Total			1,005,685
Approximated number of issues on account of all claims allowed:			
Soldiers and sailors			5,125,337
Widows			1,005,685
Total			6,131,022

EXHIBIT 22.—*Special acts.*

Since 1861 there have been allowed by special acts of Congress 53,283 pensions and increases of pensions, of which 21,474 are now on the roll, with an annual face value of $6,722,900. Only a part of this is properly chargeable to special acts, as most of the beneficiaries had been previously pensioned under general laws at lower rates.

During the Sixty-fourth Congress, after June 30, 1916, 4,178 persons were included in the special acts passed at the rates specified in the summary following:

Pensions granted by special act during the Sixty-fourth Congress, subsequent to June 30, 1916.

Rates specified.	Number granted.	Rates specified.	Number granted.
$100.00	1	$21.00	12
50.00	321	20.00	607
46.00	1	18.00	2
40.00	530	17.00	122
36.00	518	16.00	4
35.00	9	15.00	9
32.00	5	14.00	3
30.00	807	12.00	819
27.00	47	10.00	3
25.00	23	8.00	11
24.00	321		
22.50	2	Total	4,178
21.50	1		

Number of pensions granted by special acts each Congress since March 4, 1861.

Thirty-seventh (1861–1863)	12	Fifty-second (1891–1893)	217
Thirty-eighth (1863–1865)	27	Fifty-third (1893–1895)	119
Thirty-ninth (1865–1867)	138	Fifty-fourth (1896–1897)	378
Fortieth (1867–1869)	275	Fifty-fifth (1897–1899)	694
Forty-first (1869–1871)	85	Fifty-sixth (1899–1901)	1,391
Forty-second (1871–1873)	167	Fifty-seventh (1901–1903)	2,171
Forty-third (1873–1875)	182	Fifty-eighth (1903–1905)	3,355
Forty-fourth (1875–1877)	98	Fifty-ninth (1905–1907)	6,030
Forty-fifth (1877–1879)	230	Sixtieth (1907–1909)	6,600
Forty-sixth (1879–1881)	96	Sixty-first (1909–1911)	9,649
Forty-seventh (1881–1883)	216	Sixty-second (1911–1913)	6,350
Forty-eighth (1883–1885)	598	Sixty-third (1913–1915)	5,061
Forty-ninth (1885–1887)	856	Sixty-fourth (1915–1917)	5,885
Fiftieth (1887–1889)	1,015		
Fifty-first (1889–1891)	1,388	Total	53,283

EXHIBIT 23.—*Pension claims pending June 30, 1917.*

Because of the immense flood of cases and the work piled on the bureau by the act of September 8, 1916, an actual count of cases, as was done during the last two years, was not had because of the time and labor involved.

As near as can be totaled from the counts kept, claims pending are as follows:

Act of May 11, 1912	11,059
Other acts	44,986
Total	56,045
Act of Mar. 3, 1899, deserted wives	118
Act of Mar. 2, 1895:	
Accrued	5,055
Reimbursement	1,507
Cases before Board of Pension Appeals	259

EXHIBIT 24.—*Applications received in the Mail and Supplies Division during the fiscal year ended June 30, 1917.*

	Original.	Increase.	Restoration.	Total.
General law:				
Civil War—				
Invalids	87	2,268	155	2,510
Dependents	1,344		10	1,354
War with Spain—				
Invalids	1,323	551	29	1,903
Dependents	356		1	357
Regular Establishment—				
Invalids	3,323	1,820	35	5,178
Dependents	939		1	940
War with Mexico:				
Survivors	4			4
Dependents	60			60
Indian wars:				
Survivors	4,949			4,949
Dependents	1,666			1,666
Bounty land:				
Survivors	5			5
Dependents	5			5
War of 1917, survivors	9			9
Act May 11, 1912, Civil War	11,880	55		11,935
Act Apr. 19, 1908	2,756			2,756
Act Sept. 8, 1916	71,111			71,111
Act June 27, 1890:				
Dependents	359			359
Survivors			2	2
Act Mar. 3, 1899	586			586
Acts Mar. 3, 1901, and Feb. 28, 1903	95			95
Act Aug. 2, 1892, nurses	8			8
Act Aug. 8, 1882	38			38
Accrued	4,213			4,213
Arrears	32			32
Reimbursement	7,477			7,477
Total	112,625	4,694	233	117,552

EXHIBIT 25.—*Revolutionary archives.*

Total pension claims on file:	
Admitted	78,284
Rejected	10,319
Bounty land claims	8,843
Calls at bureau for examination of records, 1917	669
Certificates of service furnished, 1917	2,060
Negative replies given, 1917	3,302
Answers to miscellaneous matters, 1917	1,302
Claims drawn from files for consideration, 1917	8,103

EXHIBIT 26.—*Record cards completed to June 30, 1917, in Certificate Division.*

[This table shows all the different series of certificate numbers and the highest number given therein.]

Series.	Number of cards completed.	Highest certificate number given in series.	Remarks.
Old war invalids	9,486	9,486	
Old war widows	0	8,039	
1812 survivors	25,723	25,723	Service pensions.
1812 widows	35,520	35,520	
Indian war survivors	6,454	6,454	Do.
Indian war widows	8,350	8,350	
Mexican war survivors	20,668	20,668	Do.
Mexican war widows	16,211	16,211	
Navy invalids	28,256	42,035	Merged with Army series Aug. 12, 1910.
Navy widows	21,618	21,618	Merged with Army series Aug. 13, 1910.
Invalids (Army and Navy)[1]	9,220	1,179,220	
Widows (Army and Navy)[1]	68,964	827,336	
Total	250,470		

[1] There is no separate series of certificate numbers on account of war with Spain and Regular Establishment allowances, which are included in the invalid and widow Army and Navy series.

Revolutionary War soldiers pensioned	52,504
Revolutionary War widows pensioned	22,644
Revolutionary War daughters pensioned (special acts)	18

Old war invalid series of certificate numbers runs from No. 1 to No. 9486.
Civil War invalid series of certificate numbers begins with No. 9487.

EXHIBIT 27.—*Carding of records in record division.*

Service record cards written	18,012	
Numerical record cards written (completed)	7,176	
Alphabetical record cards written	36,470	
Total		61,658
Cards canceled through consolidation and correction		21,346
Net total		40,312
Numerical record cards written (incomplete)		53,582
Grand total cards written to June 30, 1917:		
Service record cards	2,505,790	
Numerical record cards (completed)	459,398	
Alphabetical record cards	2,748,521	
Total		5,713,709
Cards canceled through consolidation and correction		368,234
Grand total completed cards on file		5,345,475
Numerical record cards (incomplete)		414,229
Act May 11, 1912:		
Cards filed—		
Original		1,733
Increase		18,518
Cards stamped "Dead"		26,765
Cards canceled		17,861
Total on file		426,370

Examining Surgeons.

Exhibit 28.—*Report for fiscal year ended June 30, 1917.*

States.	Examining boards.	Examinations by boards.	Single surgeons.	Examinations by single surgeons.	Expert surgeons.	Examinations by experts.
Alabama	9	37	.....	.....	7	11
Arizona	1	4	3	3	2	.....
Arkansas	18	73	7	3	8	11
California	19	233	4	6	20	50
Colorado	18	80	5	5	11	2
Connecticut	9	28	1	1	5	5
Delaware	3	12	.....	.....	2	1
District of Columbia	3	178	.....	.....	10	36
Florida	9	21	2	.....	7	7
Georgia	7	49	4	13	12	7
Idaho	5	24	4	5	3	1
Illinois	89	316	3	2	30	35
Indiana	85	530	2	3	24	60
Iowa	78	107	3	.....	17	20
Kansas	65	150	5	1	22	18
Kentucky	66	292	3	2	12	24
Louisiana	3	17	3	.....	5	3
Maine	24	58	1	.....	12	1
Maryland	9	37	1	.....	5	9
Massachusetts	22	110	.....	.....	15	11
Mexico	.....	.....	1	.....	.....	.....
Michigan	53	179	3	1	21	18
Minnesota	29	63	16	13	12	8
Mississippi	7	19	1	4	7	1
Missouri	80	152	4	3	29	30
Montana	5	15	4	4	6	3
Nebraska	46	56	7	.....	7	5
Nevada	3	4	.....	.....	1	1
New Hampshire	12	20	.....	.....	2	.....
New Jersey	10	74	.....	.....	2	3
New Mexico	4	115	7	1	3	2
New York	60	299	.....	.....	29	49
North Carolina	13	75	8	32	8	8
North Dakota	4	4	1	1	4	3
Ohio	88	488	3	1	36	57
Oklahoma	35	88	1	.....	14	15
Oregon	14	36	4	2	10	7
Pennsylvania	73	286	3	1	23	29
Rhode Island	2	5	.....	.....	2	2
South Carolina	3	31	2	4	4	4
South Dakota	19	37	7	5	8	.....
Tennessee	40	266	2	2	14	27
Texas	12	103	6	6	18	16
Utah	2	12	.....	.....	2	.....
Vermont	14	40	1	2	7	2
Virginia	7	50	.....	.....	10	10
Washington	14	55	3	2	7	5
West Virginia	33	52	2	1	8	16
Wisconsin	47	57	5	5	12	6
Wyoming	2	6	5	1	1	.....
Total	1,273	5,043	147	135	536	639

EXHIBIT 29.—*Special examinations, number made, cost thereof, etc., during the fiscal year ended June 30, 1917.*

Appropriated by Congress to investigation of pension cases		$80,000.00
Expenses of special examiners:		
Per diem, in lieu of subsistence	$51,480.00	
Transportation and incidentals	27,409.57	
Miscellaneous	613,87	
Total		79,503.44
Unexpended balance		496.56
Average number of special examiners employed		51
Number of depositions taken		26,595
Number of reports submitted		5,590
Average cost per report		$14.22
Recoveries made by special examiners		$1,753.60
Review:		
Reports reviewed and referred for further examination		3,189
Submitted to Board of Review for final action		1,412
Submitted to other divisions		513
Total number of reports reviewed in division		5,114
Cases:		
In special examination division July 1, 1916	1,250	
Received during the year	2,966	
		4,216
Disposed of during the year		2,829
Number on hand June 30, 1917		1,387

EXHIBIT 30.—*Table showing the per cent of the claims of widows and dependents in proportion to the number of soldiers' deaths occurring during the year 1916.*

[The first column shows the number of deaths in each class, and the second column shows the number of applications from widows and dependents in the same class during the year.]

	Losses by death.	Widows' and dependents' claims.	Per cent.
Civil War	33,232	55,553	167
War with Spain	357	498	139
War with Mexico	133	39	29
Indian wars	114	1,401	1,229
Regular Establishment	533	741	139

EXHIBIT 31.—*Appealed cases, year ending June 30, 1917.*

	Awaiting action of Board of Review.	Awaiting action of Secretary.	Total.
On hand July 1, 1916	21	160	181
Received during year 1916-17	849	.....	849
	870	160	1,030
Referred to board for further evidence	1	1	.....
	871	159	1,030
Referred to Secretary, 759; returned, 47; receded, 35	841	759	82
	30	918	948
Affirmed, 651; reversed, 32; dismissed, 2; to Law Division, 4	4	685	689
On hand June 30, 1917	26	233	259

REPORT OF THE COMMISSIONER OF PATENTS.

ANNUAL REPORT OF THE COMMISSIONER OF PATENTS.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,
Washington, September 10, 1917.

SIR: I have the honor to submit herewith the following report of the business of the United States Patent Office for the fiscal year ended June 30, 1917:

Applications received during fiscal year ended June 30, 1917.

Applications for patents for inventions	68,690
Applications for patents for designs	2,666
Applications for reissues of patents	264
Applications for registration of trade-marks	8,714
Applications for registration of labels	884
Applications for registration of prints	320
Total applications	81,538
Disclaimers	34
Appeals on the merits	2,158
Notices of opposition	308
Total applications, disclaimers, appeals, and notices of opposition	84,038

Applications for patents for inventions.

Year ended June 30—		Year ended June 30—Continued.	
1908	58,527	1913	67,986
1909	62,800	1914	69,311
1910	63,365	1915	66,497
1911	65,365	1916	67,348
1912	69,236	1917	68,690

Applications for patents, including reissues, designs, trade-marks, labels, and prints.

Year ended June 30—		Year ended June 30—Continued.	
1908	68,441	1913	78,411
1909	73,026	1914	81,539
1910	72,533	1915	79,116
1911	74,677	1916	80,621
1912	79,747	1917	81,538

Applications awaiting action.

June 30—		June 30—Continued.	
1912	21,059	1915	18,270
1913	27,328	1916	16,559
1914	22,283	1917	16,058

Patents withheld and patents expired.

	1916	1917
Letters patent withheld for nonpayment of final fees	11,148	10,504
Applications allowed awaiting payment of final fees	18,216	15,274
Patents expired	21,324	24,777
Applications in which issue of patent is deferred under Sec. 4885, R. S.	97	120
Applications in process of issue	3,604	3,745

Patents granted and trade-marks, labels, and prints registered.

Class.	1913	1914	1915	1916	1917
Letters patent	35,025	36,276	42,734	44,155	42,328
Design patents	1,579	1,773	1,489	1,761	1,686
Reissue patents	150	176	179	217	165
Trade-marks	5,166	5,795	6,913	6,109	6,126
Labels	664	720	762	833	781
Prints	254	339	321	402	342
Total	42,838	45,080	52,404	53,477	51,428

Receipts from all sources, fiscal year ended June 30, 1917.

Applications, first fees	$1,028,038.47
Designs	39,895.00
Reissues	7,920.00
Trade-marks	86,750.00
Final fees	840,702.37
Appeals and oppositions	27,920.00
Disclaimers	330.00
Coupons	62,375.50
Drawings	5,580.96
Recording assignments	32,005.22
Labels	4,974.00
Prints	1,771.20
Court costs	
Copies of records	162,125.88
Unapplied	34.32
Official Gazette and other publications	17,096.80
Total	2,317,519.72

Expenditures fiscal year ended June 30, 1917.

Salaries	$1,362,546.35
Scientific library	2,112.01
Transportation of patents to foreign countries	878.80
Postage on foreign mail	1,024.00
Stationery	12,404.04
Furniture and sundries	11,276.48
Ice	296.47
Washing towels	136.55
Winding clocks	147.60
Telephones	791.65
Telegraphing	97.61
Investigating public use	347.66
Photolithographing:	
Current issue	57,298.64
Reproductions	59,424.16
Foreign patents	12,320.00
Photographic printing	4,467.18
Photostat supplies	5,998.06
Printing and binding:	
Official Gazette	137,976.08
Indexes	6,819.06
Specifications	381,929.28
Miscellaneous	28,217.04
International Convention for Protection of Industrial Property (estimated)	600.00
Coal	7,418.85
Fixed charges not enumerated	611.11
Total	2,095,138.68

Receipts and expenditures.

Receipts from all sources	$2,317,519.72
Expenditures	2,095,138.68
Net surplus	222,381.04
Total net surplus to date	8,219,071.35

Comparative statement.

June 30—	Receipts.	Expenditures.	Surplus.
1908	$1,874,180.75	$1,608,292.01	$265,888.74
1909	1,975,919.97	1,887,443.35	88,476.62
1910	2,022,043.26	1,953,549.76	68,493.50
1911	1,987,778.58	1,957,001.85	30,776.73
1912	2,094,059.50	2,019,236.01	74,823.49
1913	2,082,490.23	1,924,459.42	158,030.81
1914	2,169,988.95	1,929,132.52	240,856.43
1915	2,270,937.68	2,087,581.26	183,356.42
1916	2,334,030.48	2,051,656.79	282,373.69
1917	2,317,519.72	2,095,138.68	222,381.04

Appellate work.

Interferences declared	1,682
Interferences disposed of before final hearing	1,473
Interferences heard	308
Interferences disposed of	314
Interferences awaiting decision	56
Oldest case awaiting action, February 14, 1917.	
Appeals to examiners in chief in interference cases	187
Ex parte appeals to examiners in chief	1,438
Total	1,625
Appeals in interference cases disposed of	148
Ex parte appeals disposed of	1,186
Total	1,334
Interference cases awaiting action	97
Ex parte cases awaiting action	687
Total	784
Oldest interference case awaiting action, December 5, 1916.	
Oldest ex parte case awaiting action, October 30, 1916.	
Appeals to commissioner in interference cases	98
Appeals to commissioner in opposition cases	32
Appeals to commissioner in cancellations	5
Ex parte appeals to commissioner	192
Interlocutory appeals to commissioner	185
Ex parte appeals in trade-mark cases	130
Total	642
Petitions to commissioner	3,895
Total	4,537
Cases disposed of by commissioner:	
Appeals in interference cases	80
Appeals in opposition cases	43
Appeals in cancellation cases	5
Ex parte appeals	193
Interlocutory appeals	154
Ex parte appeals in trade-mark cases	134
Total	609

Petitions to commissioner	4,073
Total	4,682

Appeals to Court of Appeals, District of Columbia:	
Ex parte cases	24
Interference cases	30
Opposition cases	12
Cancellation cases	5
Total	71

During the year 71,620 applications for patents, including reissues and designs, and 178,828 amendments in pending cases were filed. The number of letters constituting the miscellaneous correspondence received and indexed was 286,791.

The number of printed copies of specifications of patents sold was 2,786,256, for which a revenue of $139,312.80 was received by the office, this amount being an increase of $12,210.65 over the receipts of last year from the sale of copies. A total of 1,231,335 copies of patents were shipped to foreign governments. The whole number of copies of patents furnished for sale, for governmental use and for foreign governments was 4,325,114.

The office received for record 31,020 deeds of assignment, containing on an average 450.23 words per deed.

Typewritten copies of records aggregating 29,131,100 words were furnished, at 10 cents per hundred words, and for certifying certain of these copies, $1,324.50 was received.

For 91,300 photostat copies of foreign patents the office received $17,872.

Respectfully submitted.

J. T. Newton,
Commissioner of Patents.

The Secretary of the Interior.

STATEMENT OF THE COMMISSIONER OF EDUCATION.

STATEMENT OF THE COMMISSIONER OF EDUCATION.

DEPARTMENT OF THE INTERIOR,
BUREAU OF EDUCATION,
Washington, October 12, 1917.

SIR: I have the honor to submit the following statement of the operations of this office for the fiscal year ended June 30, 1917, together with recommendations for the extension and improvement of its work:

GENERAL.

The work of the Bureau of Education comprises two types of service. The first consists of reporting on the status of education and educational progress in the United States and in foreign countries. Statistics form the basis of this reporting. The bureau is therefore under permanent obligation to assemble periodically statistics bearing upon all phases of educational activity. The collection, tabulation, and interpretation of such statistics involve the labor of a considerable number of persons. The statistical division proper numbers nine, and its work is supplemented by that of other divisions.

In connection with the reporting activity of the bureau a voluminous correspondence is carried on. The bureau is approached for information by thousands of citizens of the United States and by individuals and official agencies from all parts of the world. This information is furnished through the medium of letters and printed documents.

As part of the equipment of an office functioning as a source of information in regard to educational movements, events, and theories, the bureau maintains the most extensive library of educational literature in the United States.

The general dissemination of the bureau's reports, in order that the findings of the office may be made currently available for educational officers and for the general public, entails a considerable publishing activity. This is under the charge of the editorial division.

These basic operations of the office may best be recorded by divisions. Below appear the summaries of the activities of the divisions having these operations in charge.

An increasingly important, although relatively recent, development of the bureau's work is in the nature of special projects. These are in part educational investigations, in part propaganda in favor of improved educational conditions, in part administrative. They are carried on primarily by the bureau's specialists. Frequently the specialists of several divisions cooperate in a single project. This phase of the bureau's work increases constantly. The time of the specialists is more and more devoted to the performance of cooperative projects. In view of this fact, I think it wise to alter the form in which reports have previously been made and to treat the projects separately, rather than to report in detail upon the work of each division of the bureau. The activities of the four divisions first mentioned will, however, be recorded in the customary manner.

SECTION I.

Below the reporting activities of the bureau are summarized by divisions:

STATISTICS.

During the year ended June 30, 1917, the Statistical Division collected, tabulated, and summarized returns from 20,759 schools and school systems, as follows:

48 State school systems.
1,241 city school systems.
574 universities and colleges.
530 professional schools.
1,322 training schools for nurses.
278 normal schools.
734 summer schools.
12,003 public high schools.
2,203 private high schools and academies.
912 commercial schools.
397 schools for negroes.
121 State industrial schools and reformatories.
61 institutions for the blind.
159 schools for the deaf.
178 schools for the feeble-minded.

In addition to the above statistics of State school systems, which are for the year 1915, like statistics were collected for 1916.

This division prepared 67 pages of the educational directory for 1916. A bulletin on State universities and colleges was compiled; also a bulletin containing statistics of 58 public manual training schools, 315 technical and industrial training schools, and 2,536 public high schools having courses in manual and industrial training, domestic economy, and agriculture. Summaries were prepared for the statistical abstract issued by the Department of Commerce; also summaries and abstracts for use in other publications and by individuals.

The statistical division assisted in tabulating the statistics collected in connection with the several surveys made by the office and aided the various other divisions in statistical and other work.

CORRESPONDENCE.

The report of the correspondence division shows for the year ending June 30, 1917:

Letters received	137,805
Library publications received	33,674
Forms received	53,925
Documents distributed	422,063
Multigraph letters sent out	651,350

There has been an increase of some 17,000 pieces in the first-class mail received at the bureau during the year ended June 30, 1917. This count does not include letters received by field agents, special collaborators at substations and branches, and by the offices of the Alaska Division at Seattle, Wash., and Nome, Alaska.

LIBRARY.

The usual rate of growth of the library was maintained during the year. The number of volumes and pamphlets added by gift, ex-

change, and purchase was 1649; by transfer from the Library of Congress, 365; 6,200 numbers of serial publications and 7,950 numbers of periodicals were accessioned; 1,135 volumes were sent to the bindery. The division catalogued and classified 5,753 volumes. The number of bibliographies compiled on special topics was 221. Ten numbers of the monthly record of current educational publications were prepared, and also an index number to the 1916 series was compiled.

During the year the library received 725 visits from outside the office from readers wishing to consult books. Loans from the library to institutions and individuals outside of the office amounted to 3,009 volumes, a considerable increase over the previous year; 4,779 letters requesting books or information were answered. As usual, in many cases these answers were supplied by forwarding the typewritten, multigraphed, or printed bibliographies on educational subjects prepared by the library, accompanied by an offer to lend some of the books mentioned. These lists continued to be in much demand during the year. The division compiled 44 pages of the educational directory, 1916–17, and prepared a chapter on library activities for the commissioner's report, 1916.

During the year the school library exhibit material supplied by the division was used in connection with the summer library course at Columbia University, New York; by the library school at Simmons College, Boston; and at meetings of various associations of teachers and librarians in Vermont, Ohio, Iowa, Kansas, and South Dakota. Since much of the material had become worn from constant use, the exhibit was recently carefully rearranged, and bindings added and repairs made where necessary.

The library's collection of lantern slides of high-school libraries was sent to a number of places during the year. The division also attended to the manufacture of a set of 40 slides for use in library campaigns, illustrating the extension work of public libraries, with emphasis on county libraries.

In its new location in the west court of the Pension Office Building, the library is a central and conspicuous feature of the bureau. A substantial increase in shelf room here affords facilities for a unification and orderly arrangement of the collections to an extent not possible in the cramped quarters previously occupied by the library.

EDITORIAL.

The publications of the Bureau of Education for 1916–17 included the annual report of the commissioner for 1916, 49 issues of the bulletins, and 434 miscellaneous circulars and reprints. The report comprised the usual two volumes, the first containing brief interpretative reviews of current progress in various fields of education throughout the world, the second the latest available statistics on education. The miscellaneous circulars consisted chiefly of the brief mimeographed and multigraphed "letters" described in previous annual statements of the commissioner, but also included this year a number of printed circulars dealing directly with the war.

The bulletins issued during the year were as follows:

1916.

2. Agricultural and rural education at the Panama-Pacific International Exposition.
14. State pension systems for public-school teachers.
15. Monthly record of current educational publications—Index, February, 1915–January, 1916.
16. Reorganizing a county system of rural schools.
17. The Wisconsin county training schools for teachers in rural schools.
18. Public facilities for educating the alien.
19. State higher educational institutions of Iowa.
20. Accredited secondary schools in the United States.
21. Vocational secondary education.
22. Monthly record of current educational publications, September, 1916.
24. Monthly record of current educational publications, October, 1916.
25. Commercial education.
26. A survey of the educational institutions of the State of Washington.
27. State higher educational institutions of North Dakota.
28. The social studies in secondary education.
29. Educational survey of Wyoming.
30. University training for public service.
31. Monthly record of current educational publications, November, 1916.
32. Some facts concerning manual arts and home-making subjects in 156 cities.
33. Registration and student records for smaller colleges.
34. Service instruction of American corporations.
35. Adult illiteracy.
36. Monthly record of current educational publications, December, 1916.
37. Cooperative system of education.
38. Negro education, volume 1.
39. Negro education, volume 2.
40. Gardening in elementary city schools.
41. Agricultural and rural extension schools in Ireland.
42. Minimum school-term regulations.
43. Educational directory, 1916–17.
44. The district agricultural schools of Georgia.
45. Kindergarten legislation.
46. Recent movements in college and university administration.
47. Report of the work of the Bureau of Education for the natives of Alaska, 1914–15.
48. Rural school supervision.
50. Statistics of State universities and State colleges, 1916.

1917.

1. Monthly record of current educational publications, January, 1917.
3. Pine-needle basketry.
4. Secondary agricultural schools in Russia.
5. Report of an inquiry into the administration and support of the Colorado school system.
6. Educative and economic possibilities of school-directed home gardening in Richmond, Ind.
7. Monthly record of current educational publications, February, 1917.
12. Monthly record of current educational publications, March, 1917.
13. Monthly record of current educational publications, April, 1917.
14. A graphic survey of book publication, 1890–1916.
20. Work of school children during out-of-school hours.
21. Monthly record of current educational publications, May, 1917.
24. Monthly record of current educational publications—Index, February, 1916–January, 1917.
28. Monthly record of current educational publications, June, 1917.

Toward the close of the fiscal year there was unusual congestion at the Government Printing Office, due chiefly to the volume of emergency war printing, and many publications that would nor-

mally have been issued before the close of the year have been delayed. The following bulletins were still in the hands of the printer at the close of the year: Open-Air Schools, Medical Inspection of Schools in Great Britain, Reorganization of English in Secondary Schools, Current Practice in City School Administration, Department Store Education, Development of Arithmetic as a School Subject, Higher Technical Education in Foreign Countries, Studies in Higher Education in England and Scotland, Studies in Higher Education in Ireland and Wales, Accredited Higher Institutions, History of Public-School Education in Delaware, Report of a Survey of the University of Nevada, Military Training of Youth of School Age in Foreign Countries, Money Value of Education, Practice Teaching for Secondary School Teachers, Training of Teachers of Mathematics in Secondary Schools, Three Short Courses in Home Making, Statistics of Wider Use of School Plant, Training of Rural Teachers Through High Schools and County Normal Schools.

A considerable amount of special publication work was made necessary by the war. Between April 1 and July 1 some 50 separate publications were issued, ranging from one or two page statements of suggestions to school officials to the commissioner's circular of May 22, of which 35,000 copies were distributed by this office and many additional thousands sold by the Government Printing Office. The bureau's addressograph mailing lists of school officials, which have been steadily developed during the past six years, proved of special value in the war emergency, and the bureau has been able to aid many other Government agencies in their efforts to reach educational officials, especially the Food Administration and the Committee on Public Information.

SECTION II.

Below the principal special projects of the bureau are recorded:

SURVEYS.

The bureau is called upon constantly to make surveys of educational institutions, State, city, and county systems of education. The work which it has done in this field in the last three years undoubtedly constitutes one of the most important of its projects. An educational survey purports to be a critical, nonpartisan, expert examination of financial facts and records, educational policies and methods, and the social and economic setting of an institution or a group of institutions. The results of the bureau's efforts in this field have contributed to the establishment of higher standards and to a clearer understanding of the functions and purposes of various types of educational institutions throughout the country. In every case the surveys made by this office have culminated in constructive recommendations. For the most part these recommendations have received the serious consideration of local school officers and of legislatures. Many of them have already been incorporated in educational legislation.

The tendency marked by the survey movement is a wholesome one. It indicates that public authorities and educational officers desire to

secure the benefit of the best experience and to profit by the criticism of experts. Numerous agencies have made educational surveys in the past five years. This service is, however, most appropriately rendered by the Bureau of Education, because the bureau represents no locality or special interest, because its officers have the widest acquaintance with educational conditions, and because it is a public instrument supported by the whole country. The growing recognition of these facts brings an ever-increasing demand for the bureau to render this service. It should be provided with more money and more specialists to enable it to fulfill this function.

Sixteen different survey projects have been carried on during the year ended June 30, 1917. Seven of these were begun in the preceding year. Reference to them was made in my last statement.

The survey of the State educational institutions of Washington was prepared for publication during the summer of 1916. The report was issued as Bulletin, 1916, No. 26. The recommendations contained in the report formed the basis for important legislation passed by the Washington State Legislature in 1917. The survey was made by the Commissioner of Education, the specialist in higher education, and the specialist in rural-school practice, assisted by Prof. Alexander J. Inglis, of Harvard University.

A preliminary report of the survey of the public schools of Webster Grove, Mo., for which the field work was done in the preceding year, was submitted to the school board of that city during the year under review. A complete report is in course of preparation. The survey was made by the chief of the division of school administration, assisted by Dr. W. W. Charters, of the University of Missouri, and Mr. Henry J. Gerling, of St. Louis, Mo.

The report of the survey of the State higher institutions of North Dakota was prepared for publication and issued as Bulletin, 1916, No. 27. The recommendations contained in this report have served as a guide in certain reorganizations of the higher educational system undertaken by the State board of regents. The survey was made by the Commissioner of Education and the specialist in industrial education, assisted by Dr. Edwin B. Craighead, formerly president of the University of Montana, and Dean Lotus D. Coffman, of the School of Education of the University of Minnesota.

The survey of the public-school system of San Francisco, to which reference was made in my last statement, was completed and a preliminary report was made to the board of education and chamber of commerce of that city. The final report will shortly be published as a bulletin of the bureau. This survey was made by the specialist in industrial education, specialist in home economics, specialist in civic education, specialist in school and home gardening, special agent in schoolhouse construction and sanitation, and the assistant specialist in education of immigrants, assisted by Dr. W. M. Davidson, superintendent of schools, Pittsburgh, Pa.; Dr. J. Stanley Brown, principal of high school, Joliet, Ill.; Dr. John W. Withers, principal Harris Teachers College, St. Louis, Mo.; Dr. Charles A. McMurray, George Peabody College for Teachers, Nashville, Tenn.; Mr. Will Earhart, supervisor of music, Pittsburgh, Pa.; and Mr. Henry T. Bailey, North Scituate, Mass.

Work on the educational survey of the State of Delaware has been carried forward during the year. Service has been rendered by the

specialist in rural-school practice and two assistant specialists in rural education, the specialist in industrial education, one of the specialists in home economics, the school-extension agent, the specialist in civic education, and one of the specialists in school and home gardening.

The work of the survey of the educational system of the State of Tennessee begun in the preceding year is still pending.

A comprehensive survey of private and high schools for negroes in the United States, which has occupied the attention of the division of education of racial groups for four years, has been completed and published in two volumes, as Bulletin, 1916, Nos. 38 and 39, under the title "Negro Education—A Study of the Private and Higher Schools for Colored People in the United States."

A survey of the Wyoming school system, undertaken during the preceding year upon the invitation of the Wyoming school code committee, was completed and the report published as a bulletin of the bureau, 1916, No. 29. This survey was conducted by the specialist in agricultural education and rural-school administration and one of the assistants in rural education.

At the request of the Colorado survey committee of public affairs the bureau undertook an investigation of the administration and support of the Colorado school system. Report of this investigation was published as Bulletin, 1917, No. 5. The report was made by the specialist in agricultural education and rural-school administration and one of the assistants in rural education.

A survey of the public-school system of Elyria, Ohio, was undertaken during the year upon the request of the board of education and the superintendent of public instruction of the State of Ohio. The field work has been completed and the report is in preparation. The survey was made by the chief of the division of school administration, the specialist in educational systems, the specialist in school and home gardening, the specialist in industrial education, one of the specialists in home economics, the special agent in schoolhouse construction and sanitation, the specialist in civic education, and the assistant specialist in immigrant education, assisted by Dr. William F. Russell, George Peabody College for Teachers; Dr. William C. Ruediger, George Washington University; Mr. Will Earhart, supervisor of music, Pittsburgh, Pa.; Mr. C. Valentine Kirby, supervisor of drawing, Pittsburgh, Pa.; and Mr. August Hiller, accountant of board of education, Pittsburgh, Pa.

The administration of the Bradley Polytechnic Institute, Peoria, Ill., requested a survey to determine the future function of that institution. A brief investigation of the institution was made by the Commissioner of Education, the specialist in higher education, and the specialist in industrial education. With the consent of the trustees and president the bureau agreed to direct activities of faculty committees in making a survey of the institution. Reports of the faculty's investigation have been submitted and approved by the bureau.

A survey of the University of Nevada was made at the request of the governor of the State and the board of regents of the university. The report of the findings was submitted in February and is now in press. It will be issued as Bulletin, 1917, No. 19. The survey was

made by the specialist in higher education, assisted by Mr. E. B. Stevens, executive secretary of the University of Washington.

A survey of the entire educational system of the State of Arizona was made at the request of the State superintendent of public instruction, president of the university, and the State teachers' association. The public elementary and secondary schools were investigated by the specialist in agricultural education and rural school administration, the specialist in rural education, one of the assistants in rural education, the chief of the division of school administration, and the special agent in schoolhouse construction and sanitation. The State normal schools and the department of education at the State university were studied by the specialist in rural school practice. The State university was investigated by the specialist in higher education, assisted by President Livingston Farrand, of the University of Colorado. A preliminary report on the public elementary, secondary, and normal schools was submitted to the State officers in January, 1917. The final report is now in preparation.

A survey of the rural schools of Walker and Falls Counties, Tex., was undertaken by the specialist in rural school practice, the specialist in rural education, and an assistant in rural education, and by Mr. C. H. Lane, of the Department of Agriculture, detailed to this bureau for that purpose.

A survey of school and home gardens in Atlanta, Ga., was made at the request of the city board of education, and a report was submitted to the board. This survey was made by one of the specialists in school and home gardening.

Field studies for the report on educational conditions and needs of the southern Appalachian mountain region have been completed, and the data are awaiting compilation and interpretation.

INVESTIGATIONS, CONFERENCES, AND PUBLICATIONS.

Projects of less magnitude, which may be classified under the above heading, have been carried on by each of the divisions of the bureau.

HIGHER EDUCATION.

Several studies relating to higher education have been brought to completion and published, namely, a report on recent movements in college and university administration, a bulletin on accredited secondary schools in the United States, a study of registration and student records in smaller colleges, and a bulletin presenting statistics of State universities and colleges. A study of the 1862 land-grant fund and the colleges established under its provisions has been completed and submitted for publication.

With the entrance of the United States into the war it became desirable to establish a common policy of cooperation between the higher institutions and the Government, a policy which would result in the fullest utilization of higher educational resources of the country for national defense and service. A committee of the Advisory Commission of the Council of National Defense undertook to bring representatives of higher education together for this purpose, and, concurrently, to act as a medium of communication between the institutions and the Government and among the institutions themselves.

The specialist in higher education has served as executive officer of this committee since its formation.

Decisions have been rendered as to the eligibility of 530 universities, colleges, and schools for inclusion in the list of institutions to be accredited by the United States Military Academy.

SCHOOL ADMINISTRATION.

The projects aside from the surveys just mentioned undertaken in the field of general school administration have consisted of three studies, namely, a study of the current practice of city school administration, a study of school legislation in 1916, a digest of State laws relating to libraries. The history of education in Delaware was completed and work begun on the history of education in Arizona and Minnesota.

SCHOOL HYGIENE AND SANITATION.

The special agent in schoolhouse construction and sanitation has been called upon frequently to advise school boards and other school officers regarding the location and construction of school buildings. He has visited for these purposes Washington, D. C., St. Petersburg, Fla., Florence, Ala., Little Rock, Ark., and a number of smaller places, his expenses as a rule being paid by the communities served. He has furnished through correspondence his judgment on blue prints for school buildings and has made plans for small buildings for rural communities.

The special agent in school hygiene gave an aggregate of 23 days to the service of the bureau. He prepared a chapter on educational hygiene for the report of the commissioner, collected material on military training, and answered inquiries relating to school hygiene received at the bureau.

RURAL EDUCATION.

Three investigations have been brought to completion, aside from the surveys of rural education mentioned in preceding pages. These are a study of rural school supervision, an investigation of rural teacher preparation through secondary institutions, and an investigation into the teaching of agriculture. The first appeared as a bulletin of the bureau; the last two are shortly to be issued. Progress was made on a readjusted course of study for rural schools.

The campaign for the improvement of rural school conditions was continued during the year. Three important rural conferences were held at Lincoln, Nebr.; Philadelphia, Pa.; and Rock Hill, S. C., to be followed by similar conferences at St. Paul, Minn; Little Rock, Ark.; Denver, Colo.; Chico, Cal.; and Los Angeles, Cal. The principal objects to be accomplished through these conferences are the following:

1. An academic term of not less than 160 days in every rural school community.
2. A sufficient number of teachers adequately prepared for their work.
3. Consolidation of rural schools where practicable.
4. Teacher's home and demonstration farm of five or more acres as a part of the school property.

5. An all-year school session adapted to local conditions.

6. A county library with branch libraries at the centers of population, the public schools to be used as distributing centers.

7. Community organization with the school as the intellectual, industrial, and social center.

8. A high-school education for all country boys and girls without severing home ties in obtaining that education.

9. Such readjustment and reformation of the course of study in elementary and secondary rural schools as will adapt them to the needs of rural life.

At each of these conferences the Commissioner of Education or a representative of the bureau made a comprehensive survey of the entire field of rural education, in which he covered the foregoing nine problems as set forth in the bureau's nation-wide campaign for better rural schools.

An effort was made in the discussions by all who took part on the program to set forth the actual conditions now existing in the rural schools of the country and to make suggestions for their improvement. Many of the leaders in rural education and rural life betterment were in attendance at these conferences.

In order to determine what conditions of rural life must be met by the rural schools in at least one section of the country, a specialist in rural education has devoted several weeks to the study of rural homes in Delaware and New York. In the prosecution of this study numerous farm homes were visited for several days at a time. On the background of this field investigation the elaboration of a course of study for rural schools in hygiene, health, and sanitation was undertaken. This very important project is still going forward.

The National Rural Teachers' Reading Circle has been continued under the direction of the specialist in rural school practice.

The improvement of the rural school is admittedly the greatest present educational need. For several years the Commissioner of Education and a considerable proportion of the bureau's force have devoted more energy and attention to propaganda bearing on rural school betterment than to any other single task. In a certain sense, the regeneration of the rural school constitutes the major project of the bureau, to which many kinds of operations contribute. Constant publicity, addresses before the people of small country communities, conferences of educators, and other seemingly casual activities, all help to create a sentiment in favor of improved conditions. The members of the staff of the division of rural education have devoted much time to work of the sort mentioned.

VOCATIONAL EDUCATION.

Conferences on industrial education were held under the bureau's direction at Nashville, Tenn.; Indianapolis, Ind.; and Kansas City, Mo. Conferences on home economics were held at the bureau's call in Washington and in Boston. This division has published a bulletin entitled "Three Short Courses in Home Making," and prepared and issued a considerable number of special mimeographed letters on home economics subjects.

SCHOOL AND HOME GARDENS.

During the period of the war many people are giving largely of time and money in the campaign for the production and conservation of food. School-directed home gardening in cities and towns has demonstrated its value in increasing food production. The entrance of the United States into the war has focused attention on the work of this division of the bureau and has greatly increased the calls made upon it for direction and advice.

An important project of the bureau during the past year, demonstrating the possibilities of school-directed gardening, has been the intensive supervision of gardening in eight cities in Virginia, North Carolina, and Tennessee by one of the specialists in school and home gardening. Thirty-nine teachers are working under the direction of this specialist. Although June 30 is early for the harvesting of garden products even in the South, the children of these cities had produced $4,791.87 worth of vegetables previous to this date. On July 31 a total of $11,618.50 worth of vegetables had been harvested.

It is yet too early in the garden season to give anything like a complete report for the cities of the country. Thirty-four cities report 67,388 children engaged in home-garden work, and on August 15, 1917, these same cities give the value of home-garden products harvested to date as $142,960.33. Thirty-one cities state that large school gardens are being conducted, and give the value of garden products to August 15 as $10,183.60.

One of the specialists in school and home gardening was detailed for some weeks to Atlanta, Ga., where he successfully inaugurated home gardening under school supervision. After the work was started the school authorities employed a person to supervise the work of the garden teachers.

Courses for the training of garden teachers were given by specialists of the bureau in the summer schools of Cornell University, George Peabody College for Teachers, and Teachers' College of Columbia University.

An investigation relating to garden work has been published, namely, a study of the "Educative and Economic Possibilities of School-directed Home Gardening in Richmond, Ind." Approximately 100 cities have adopted the bureau's plan of school-directed home gardening.

KINDERGARTEN EDUCATION.

Two studies have been carried to completion by the division of kindergarten education—one a bulletin on kindergarten legislation, the other a study of the methods of kindergarten supervision. Other studies now in progress are out-door kindergartens and the relation of kindergartens to community welfare.

The work of this division has been carried on by seven special collaborators, three in Washington, three in New York, and one in California. Much of the effort of the division has been in the direction of securing legislation providing for the extension of kindergartens, and in the promotion of the establishment of new kindergartens. To this end the division has organized women's clubs and furnished legislative committees with information. Important legislation bearing

on kindergartens has been passed in five States, largely in response to the efforts of members of this division.

HOME EDUCATION.

The work of the bureau in fostering education in the home has gone forward and has increased in magnitude. It is carried on largely through correspondence and through the dissemination of courses of reading. During the present year the single new project undertaken in this field was the preparation of a reading course in American history. About 100,000 copies of reading courses were distributed and the cooperation of libraries and library commissions has been obtained. About 6,000 persons are now enrolled in the National Reading Circle.

Efforts for the improved care of children in the home, begun several years ago, have been continued. About 30,000 bulletins on the Care of the Baby were distributed to parents in rural districts.

A study of parent-teacher associations in the District of Columbia and several States is now in progress.

CIVIC EDUCATION.

The bureau has undertaken to promote training in citizenship and the stimulation of civic consciousness through the activities of three separate divisions. The special agent in civic education has assisted in bringing to completion the report of a committee on Social Studies in Secondary Education, published as Bulletin, 1916, No. 28. The report of this committee follows two other important bulletins issued by the bureau in 1915 on different phases of civic education. As the result of these studies the States of Pennsylvania, Connecticut, Massachusetts, and New Jersey have enacted legislation providing for the establishment of courses for training in the duties of citizenship.

IMMIGRANT EDUCATION.

A second aspect of the bureau's work in the promotion of education for citizenship is undertaken by the division of immigrant education. The division has a triple purpose: (1) To serve as a national clearing house of information; (2) to establish standards and methods in the education of immigrants; (3) to promote cooperation of all agencies dealing with the problem of Americanization. In the accomplishment of the first purpose a large correspondence is carried on and leaflets, pamphlets, circulars, and posters are distributed. A schedule of standards and methods has been prepared by the division and adopted in the education of immigrants in a number of cities. A National Committee of One Hundred on Americanization to act as an advisory council to the bureau has been organized. The specialist in immigrant education has coordinated the efforts of numerous committees and associations, National, State, and local, dealing with this important project. The activity of this division has included the preparation of a war Americanization plan, the organization of an educational section in the National Safety Council, and cooperation with chambers of commerce in holding America-first meetings.

COMMUNITY ORGANIZATION.

The principal project undertaken by the division of community organization was the preparation of a model bill to make adequate and consistent provision for community use of public-school houses. This, together with an explanatory brief, was sent to governors, State superintendents of public instruction, and legislators in several States. Legislation looking toward the larger community use of public-school property was enacted in Iowa, Michigan, Minnesota, New Hampshire, New Mexico, New York, North Carolina, Texas, and Utah. Cooperation was lent by the bureau, through this division, in the inauguration of community organization in the District of Columbia. Addresses were made at numerous meetings of citizens and educational organizations.

NEGRO EDUCATION.

The report of the survey of negro education which has been in course of preparation for several years has now been issued and will form the basis for constructive work among the institutions for negroes. As a part of such constructive work the division of negro education planned and has held in Washington since the close of the fiscal year, a very important conference covering two days at which were present a large number of persons, white and colored, especially interested in the education and progress of the colored race.

FOREIGN EDUCATIONAL SYSTEMS.

The work of the bureau in reporting the work of foreign educational systems finds its principal outlet in the report of the Commissioner of Education, a large proportion of which is devoted to the account of educational movements in foreign countries. In addition, the division of foreign educational systems has published three studies, namely, one dealing with secondary agricultural schools in Russia, one dealing with higher technical institutions in foreign countries, one dealing with military training of youth of school age in foreign countries. A study of vocational education in the countries at war is ready for publication.

ALASKA.

The Bureau of Education is charged with the administration of the education of the natives of Alaska. Report on it follows:

The work of the Alaska Division for the native races of Alaska has been carried on in accordance with the terms and purposes of the congressional appropriations for their education, medical relief, and for the extension of the reindeer industry among them. In the schools, emphasis has been placed upon instruction in matters pertaining to health, industrial training, gardening, and commercial education. Effort has been made to improve living conditions in the villages, to lessen the death rate, and to render the natives better able to cope with the conditions which confront them.

Sixty-eight schools were maintained with an enrollment of approximately 3,600. Four superintendents, one acting superintendent, and 111 teachers were employed.

The school buildings at Noorvik, Shaktoolik, and Port Moller were completed during the year. Teachers' residences were erected at Hydaburg and Klawock. The erosion of the bank of the Yukon River made necessary the taking down of the Fort Yukon school building, which will be rebuilt at a greater distance from the river. The region surrounding the village on Golovin Bay, in northwestern Alaska, is barren, and it was with difficulty that the Eskimos could support themselves in that location; they, therefore, migrated across the peninsula to a tract on the northern shore of Norton Bay, where they have an abundant supply of fish, game, timber, and reindeer moss for their herds. The school was reestablished within this tract, which was reserved for the natives by Executive order. A wireless telegraph station was established at Noorvik.

Action was again taken to put in operation the industries in Metlakatla, on Annette Island. A lease was entered into with cannery operators of Seattle, Wash., of a site for a salmon cannery, and of fish-trap rights within Annette Island Reserve. The lessees pay 1 cent per salmon for all salmon caught in traps and an annual permit fee of $100 for each fish trap erected on the reserve. They guarantee the payment during the season of 1917 of not less than $4,000 for fish-trap privileges. The cannery is to be operated for five seasons beginning with 1918. For the cannery and fish-trap privileges during these five years the lessees guarantee the payment of not less than $6,000 per annum. Except in a few instances where skilled labor is required, only native inhabitants of Annette Island are to be employed. It is hoped that the annual income to the Metlakatlans from this lease will enable them at the end of the period of the lease to purchase all of the lessees' interests and operate the cannery themselves, under the supervision of the Federal Government. A local cooperative company has rehabilitated the sawmill which is now furnishing lumber for the cannery building as well as for other buildings in the village. Six thousand dollars of the bureau's funds were expended in installing a water system to furnish drinking water for the village and water power for the cannery and sawmill.

For the fiscal year 1915–16, Congress appropriated $25,000 to provide for the medical relief of the natives of Alaska; in addition, $19,000 of the appropriation for the education of natives of Alaska was used for that purpose, making a total of $44,000 for medical relief during the year. The appropriation for medical relief was increased from $25,000 to $50,000 for 1916–17, but as none of the education appropriation was used for medical relief the total expended for that purpose during 1916–17 was only about $6,000 more than during the previous year. A well-equipped hospital was maintained at Juneau with a physician in charge and three nurses in attendance; the small improvised hospitals at Nulato and Kanakanak were continued; the hospital at Kotzebue was not in operation during the year, owing to the fact that the physician formerly in charge left Kotzebue too late in the season to permit of a successar being secured for that remote station before the close of navigation.

In all 5 physicians and 10 nurses were employed; in several of the Alaskan towns payments were made for the treatment of natives in hospitals and by physicians upon the request of superintendents or teachers; teachers at stations remote from a hospital, physician, or

nurse, were furnished with medical supplies for use in relieving minor ailments.

Plans were made for the establishment of a small hospital at Akiak, on the Kuskokwim River, and material for the erection of a hospital building at that place was purchased in Seattle. Great difficulty was experienced, however, in securing transportation for the building material and hospital supplies to this isolated place. The only vessel which it was possible to secure proved unseaworthy, was unable to reach her destination, and had to return to Seattle with her cargo undelivered and part of it in a damaged condition. It was then too late to secure another boat to make the voyage during the short season of open navigation remaining. Consequently it was necessary to postpone the erection of the hospital at Akiak until the fiscal year 1918.

The appropriation of $5,000 for the distribution of reindeer among the natives and the training of the natives in the care and management of reindeer was used to establish new herds and to support native apprentices being trained in the industry. The increased cost of food and clothing has made it impossible for the Government to train as many apprentices with the same appropriation as formerly.

The latest available statistics regarding the reindeer are those for the fiscal year ended June 30, 1916, which show that during that year the number of reindeer increased from 70,243 to 82,151, and the number of herds from 76 to 85. Of the 82,151 reindeer, 56,045, or 68 per cent, were owned by 1,293 natives; 3,390, or 4 per cent, were owned by the United States; 5,186, or 6 per cent, were owned by missions; and 17,530, or 22 per cent, were owned by Lapps and other whites. The total income of the natives from the reindeer industry during the fiscal year, exclusive of the meat and hide used by the natives themselves, was $91,430. The total number of reindeer, 82,151, is a net increase of 17 per cent during the year, notwithstanding the fact that about 13,200 reindeer were killed for meat and skins.

There is still need for the extension of the industry on the Aleutian Islands, and especially in the delta country between the Yukon and Kuskokwim Rivers, where hundreds of natives are living in abject poverty, unreached by civilizing influences.

The fairs, of which four were held during the winter, again proved to be a great stimulus to the natives engaged in the reindeer industry.

MEETINGS AND ADDRESSES.

A vital part of the bureau's contribution to the progress of American education consists in the attendance of representatives of the office at educational meetings, conventions, and conferences. The specialists of the bureau are able to contribute by word of mouth important information which often finds immediate application in the determination of policies. At the same time they receive impressions which aid in the interpretation of educational activities as recorded in printed documents. Nearly every specialist in the office attends a large number of educational meetings in the course of the year. Nearly every one makes frequent addresses on educational topics. The work of the office in this direction has been carried forward during the year under review as in the past.

CIRCULAR LETTERS.

The bureau acts as a clearing house for current educational events, reporting upon them briefly and circulating the reports among the particular groups of school officers chiefly interested. This service has proved exceedingly valuable. It is constantly commended by educators all over the country, and the bureau is urged to continue and extend it. This service is performed principally through the medium of multigraphed letters, running from one to four pages in length. During the year 319 such letters were issued.

REPORT OF THE COMMISSIONER.

The annual report of the Commissioner of Education is more than the record of an administrative officer. It is a current history of education in the United States and in the principal foreign countries of the world. It has come to be looked upon as an authoritative source of information by students of education throughout the United States and even beyond its borders. A large proportion of the time of each of the divisions of the bureau is devoted to the preparation of chapters of this report. The report prepared during the year ended June 30, 1917, consisted of two volumes, the first containing 37 chapters devoted to the discussion of educational progress in the United States and most of the culture countries of the world, the second containing 14 chapters devoted to a statistical presentation of education in the United States.

MISCELLANEOUS.

During the year one assistant specialist has been added to the Division of Rural Education, and the special collaborator in commercial education and one of the special collaborators in community organization have been given regular appointments. The number of special collaborators at the end of the fiscal year was 132, of whom 14 had desks in the office in Washington. All the special collaborators in Washington, those in the substations of the bureau, and many of those in the field rendered valuable service within the year. It should be understood that these special collaborators work under the same immediate direction of the Commissioner of Education as do other employees of the bureau and do only such work as belongs properly within the province of the bureau.

The study of higher education in the British Isles, begun three years ago, has been completed by the delivery of a report on the universities in Ireland and Wales. In my statement for last year the transmission of the reports on legal education in Great Britain and on the universities of England and Scotland was reported.

A special collaborator of the bureau has completed valuable studies which have been, or will be, published as bulletins of the bureau—an analytic study of courses in agricultural colleges in the United States; a study of what land-grant colleges are doing to prepare teachers in agriculture, home economics, and trades and industries for secondary schools; and a study of the activities of school children in out-of-school hours.

The need for specialists and for more clerical help, previously reported, continues and increases. Since the 1st of July, 1910, the

correspondence of the bureau, as indicated by the number of pieces of first-class mail received, has increased more than 600 per cent, and other clerical work has increased as much or more. Yet the clerical force of the bureau has increased less than 40 per cent. The work of the bureau is much impeded as a result. There is an urgent need for an immediate increase of not less than 100 per cent in the number of stenographers, typewriters, and statistical and other clerks.

The need for a larger amount of funds for the payment of traveling expenses of specialists in the bureau continues. It is clearly evident that the bureau can never serve the educational interests of the country effectively so long as its specialists depend on local communities and institutions which they visit to pay all or most of their expenses for travel and subsistence. As pointed out in a previous statement, this can only result in a discrimination against those communities and institutions most needing the help of the bureau. The allowance for travel should be several times greater than it now is.

In regard to the need for more specialists and for such a salary scale as will enable the bureau to obtain the continued services of men and women of the largest ability, I beg to quote from the statement of the Commissioner of Education for the fiscal year ended June 30, 1916:

> In many of the most important phases of education the bureau is able to render little or no service, because it has in its employ no persons with special knowledge of them. In none can it serve fully and effectively, because in no division of the bureau dealing with the principles of education and their practical application is there a sufficient number of specialists to enable the division to respond to more than a very small number of the demands made upon it. If the bureau is to render the service which the country expects of it, and which it should render for the promotion of the cause of education throughout the country, not only must it have on its staff a much larger number of experts in various lines of educational work but it must be able to pay them larger salaries. The salaries now paid for expert service in the bureau are lower than are paid corresponding grades of service in other Government bureaus and much less than is paid for work of a lower grade in State, county, and city school systems.

There can be no question that the agency on which the Federal Government depends for the stimulation and guidance of the most important interest of the Republic—the right education of its children and youth—on which all else depends, should be fully and adequately equipped for its work. This kind of work had better not be done at all than not done well.

Practically all the needs of the bureau set forth in the statement of the commissioner for the last two years still exist. The rapid movement of events within these years has created and brought to light others equally important. I, therefore, beg leave to submit once more, with slight modifications and with some additions, recommendations submitted in the statements for the last two years:

RECOMMENDATIONS.

1. An increase in the salaries of chief clerk, editor, statistician, specialist in land-grant college statistics, specialist in higher education, and other specialists, and the removal of the limit on amount of salaries which may be paid from the lump-sum appropriation for

rural education, industrial education, and school sanitation and hygiene. The duties of these positions require the services of men and women of such kind and degree of ability as demand salaries considerably higher than are now paid in this bureau.

2. An assistant commissioner, who should also be a specialist in secondary education and should serve as chief of a high-school division of the bureau. The duties of the office make it necessary for the commissioner to visit distant parts of the country and to be absent from the office frequently many days at a time. There should be an assistant commissioner to carry on the work in the office during his absence and to relieve him of much of the routine work of the office, so that he may be able to give more time and attention to the larger problems of education and to direct more effectively the more important work of the bureau. Probably the most important phase in public education in the United States at present is that of the secondary schools. The high school is, or should be, the heart and center of our school system. The problems of the high school are more difficult and their solution more urgent than those of any other part of the school system. The head of the high-school division of the bureau should, therefore, be a man of great ability. By combining the offices of assistant commissioner and of specialist in secondary education it should be possible to pay a salary sufficiently large to obtain the services of such a man.

3. Additional specialists in higher education, including education in universities, colleges, schools of technology, schools of professional education, and normal schools. The constant and increasing demands from these schools for the help of the bureau in making surveys and for advice as to their reconstruction and better coordination are larger and far more numerous than it can meet with its present force. There is special need of an able man, familiar with agricultural education and the problems of Negro education in the South, to devote his entire time and attention to the colleges of agriculture for Negroes in the Southern States. Such a man might easily make the use of the $1,109,198, of which $282,121 are appropriated by the Federal Government, from 25 to 50 per cent more effective than it now is.

4. Additional specialists in school and home gardening. The proper education of many millions of children, and even the possibility of their attending school at all during the years in which attendance at school is most valuable, depend to a very large extent upon the general adoption of the work which the bureau is promoting through this division. It is very important that there should be in the bureau a sufficient number of specialists in this subject to visit all cities, towns, and manufacturing villages in the country, advise with their school officials and teachers, and assist in directing the work of teachers until the plan is well enough understood and there are enough trained teachers that work in any city or town who may go on without outside direction, or until the several States have made provision for the direction of the work from their offices of education. The enactment of the national child-labor law prohibiting the employment of children under 14 years of age in mills, mines, and quarries must result in enforced idleness of hundreds of thousands of boys and girls and in unnecessary hardships to them and their parents unless there is found for them some form or forms of suitable employment economi-

cally profitable and at the same time educational. Results obtained through home and school gardening confirm the belief that both economically and educationally this is one of the very best forms of employment for children between the ages of 8 and 14 years. The demand for increase in food production because of the war emphasizes the economic importance of this. A group of 10 or a dozen men and women in this division, with the help of one-half as many stenographers, typists, and other clerks, could within a few years bring about the establishment of this most valuable phase of education in all or most of the cities, towns, and manufacturing communities of the country.

5. An increase in the number of specialists and assistants in rural education and industrial education. The few specialists now employed in these subjects are wholly unable to do more than a small part of the work needed. States are asking for expert advice in regard to school legislation and the improvement of their school systems. States, counties, and local communities want comprehensive and detailed school surveys. There is need and demand for such general and authoritative studies of school administration, courses of study, methods of teaching, and adaptation of the work of the schools to the life and needs of the communities which they serve as can be made effectively only by a large group of men and women of the best ability working under the direction of the Federal Government. The passage of the Federal vocation act, the so-called Smith-Hughes Act, and the creation of the Federal Board for Vocational Education relieves the Bureau of Education to a certain extent of responsibility in regard to vocational education in certain classes of schools and for certain classes of persons, but at the same time it emphasizes the importance of the work which the bureau should do for vocational education in other schools and for other classes of persons.

6. The addition of two or three specialists to the newly formed division of commercial education for the investigation of problems of commercial education and to assist in making plans and finding means for the preparation of our young people for participation in the larger commercial life upon which the country is now entering. The rapid expansion of the foreign commerce of the United States, because of the war and for other reasons more permanent, makes the need for this division more pressing than when it was first recommended some years ago.

7. More adequate provision for the investigation and promotion of school sanitation and hygiene and the physical culture and development of pupils. Nearly 20,000,000 children spend a good part of their time each year in public and private schools in the United States. They come to these schools that they may gain preparation and strength for life. In many of the schools the heating, lighting, ventilation, and other means of sanitation are so poor that instead of gaining strength for life they have the seeds of disease and death sown in their systems. In many other schools the daily regimen is such as to cause the children to lose a very large per cent of that which they might gain with a better regimen. From State, county, and city school officers, in all parts of the country, thousands of requests come to the bureau for information and advice in regard to these matters. The bureau should be able to give accurate informa-

tion and sound advice regarding various phases of this subject. The establishment of health and right health habits must be considered a most important and vital factor in any education that is to fit for life. Provision for such games, plays, drills, and other exercises as will develop physical strength, bodily control, and endurance is essential to the schools of any nation that would maintain for all its citizens a high degree of preparedness for the duties both of peace and of war. Facts revealed by the physical examination of volunteers for the Army and the Navy and of selected men in the Army show most clearly the need for this service.

8. The formation of a division, with a group of able specialists and assistants, for the investigation of problems of education and school administration in cities and towns. The drift of population to the cities and towns continues, and the proportion of urban population to rural population is increasing rapidly. Almost one-half of the children in the United States now live in cities, towns, and densely populated suburban communities. In some sections of the country a very large proportion of these children are the children of foreign-born parents. All this adds to the complexity and difficulty of the problems of city-school administration, especially in the larger cities. Many hundreds of requests for advice and information in regard to these problems come to the bureau every year. At present there is no one in the bureau whose special duty it is to respond to them. Within the last few years requests have come to the bureau for comprehensive educational surveys in dozens of cities, and many other cities have appealed to other agencies for work of this kind because their superintendents and boards of education knew that this bureau was not equipped as it should be to do this work. If the right education of the 12,000,000 children who live in cities is a matter of interest to the Nation as a whole, then this bureau should be enabled to do effectively those things which no other agency can do to assist the school officers and teachers of these cities in making the work of their schools more effective. The large and increasing number of requests for comprehensive surveys of city school systems and for advice and assistance in the readjustment of courses of study and in regard to other phases of city school administration make it necessary for the bureau to be able to do this kind of work effectively if it is to retain the respect of school officers interested in this very large and important part of our school system as a reliable and effective agency for information, advice, and assistance.

9. The establishment of a division, with specialists and assistants, for the investigation of the education of exceptional children. There are in the United States more than 2,000,000 children whose education requires means varying widely from those in common use for the education of normal children. These children are to be found in cities, towns, and rural communities alike, and all school officers and teachers have to deal with them. The Bureau of Education can not be considered as performing its duties to all the population with impartiality until it has in its service men and women who can give accurate information and helpful advice in regard to the education of these children.

10. Provision for the investigation of the education of adult illiterates and the dissemination of information as to the best methods of teaching illiterate men and women to read and write, and of extend-

ing the meager education of those who were denied the advantages of the schools in their childhood and youth. According to the census of 1910, there were in the United States more than 5,500,000 illiterate men and women and children over the age when they may be expected to make a beginning in the public schools, and there were many millions more barely able to read and write. This illiteracy is a burden to society and a menace to State and Nation. Within the past few years much interest in the removal of this burden has developed. The response to the little attention which this bureau has been able to give to this subject indicates that States, local communities, individuals, and benevolent societies are ready to cooperate heartily with the Federal Government in any reasonable plans which may be devised and presented by this bureau for this purpose. Within the past two years the people of the country have become conscious of the special need for more adequate provision for preparing for American life and possible citizenship the large number of persons who come to this country from southern and eastern European countries. It is especially important that they be given opportunity for learning the language of the country and that they be induced to take advantage of this opportunity. States and cities must provide the means for this, but the task of working out effective plans and of assisting States and cities in putting them into operation belongs to the Nation as a whole, and this bureau is the Nation's logical agent for this work. For reasons easy to understand, the United States Army refuses to accept volunteers who can not read or write, but in some of the States from 10 to 25 per cent of the men selected by the draft are illiterate. Had it been made possible for this bureau to undertake the leadership of the campaign for the reduction and eradication of adult illiteracy at the time it was first recommended, this percentage would be much smaller than it now is.

11. A careful and thorough investigation as to the means of better education of children in their homes, and the dissemination of information as to the best methods for the early physical, mental, and moral education of children in the home, and for the better cooperation of home and school in the education of children of school age. Children of the United States are in school less than 4 per cent of their time from birth to 21. The home is the primary and fundamental educational institution. Schools and other agencies are only secondary. If education in the home fails, no other agency can make good the failure. With our changing civilization and social and industrial life, there is need for more careful study of education in the home. The bureau has already made a beginning in this work, but there is need of far more than it can hope to do without much larger equipment for it.

12. A specialist in educational theory and practice, to serve as a director of investigations in education, assisting National, State, and local committees and commissions and making available for them the large collections of material in the library of the bureau and elsewhere in Washington. National, State, and local associations appoint many committees, and States and cities appoint many commissions to investigate and report on various problems of education. Many of these committees and commissions fail more or less completely for want of material and intelligent assistance and direction.

The library of this bureau, one of the most complete of its kind in the world, contains a large collection of material for most of these investigations. The specialist here recommended could put this collection at the service of these committees and commissions and at the same time give much-needed assistance and direction. His services would also be valuable to other specialists in the bureau and to hundreds of individual students of education upon whose investigations the country depends for most of its knowledge of education. This recommendation has been repeated each year for five years. The need of such a person in the bureau becomes greater and more pressing each year. Most of the work of the bureau suffers from want of the assistance he could give.

13. An assistant editor. The editorial work of the office has increased more than sixfold within the past six years, and it must increase still more within the next few years. It is now impossible for one editor to perform satisfactorily all the required editorial work. The more careful editing of the reports and bulletins of the bureau which this addition to the editorial staff would make possible would save each year in the cost of printing much more than the salary of an assistant editor.

14. A specialist in foreign and domestic systems of education and an assistant in foreign systems of education. This bureau is undertaking to keep the people of the United States informed as to all important progress in education and in methods of teaching in all countries of the world. The radical revolution in education in all countries of the world which will follow the close of the war and which has already begun in several of the more important nations, makes it imperative that this work be done thoroughly and well; if it is not, the educational interests of this country will suffer great and irreparable loss, and it can not be so done without the additional assistance indicated.

15. Two additional collectors and compilers of statistics. Material for prompt and reliable statistical reports can not be had by this bureau without occasional visits to State and city education offices and the first-hand study of their returns. For the progress of education in the United States and for such an understanding of State and local systems of education as will promote the desired degree of uniformity, it is very important that this bureau shall, in cooperation with State and city school officers, devise and execute plans for greater uniformity in reporting and assisting the several States in making their reports more comprehensive and complete. This is not possible with the small force the bureau now has for this work.

16. A comparatively large increase in the number of clerks, stenographers, copyists, laborers, and messengers to do the work of the bureau as it is now organized, and a still larger increase to do such additional work of this nature as may be made necessary by any enlargement that may be made in the staff of specialists.

17. An increase of appropriation for traveling expenses for the commissioner and employees acting under his direction. This is necessary to enable them to make original investigations in education in different parts of the country and to disseminate information by meeting with educational associations and other societies interested in education. Without funds sufficient to pay necessary traveling expenses, the bureau can not do its work effectively, and must con-

stantly be open to the charge of giving help where expenses can be paid rather than where help is most needed.

18. Means to enable the bureau to cooperate with schools of education in colleges and universities, with normal schools, and with city and county school systems in making important investigations and definite experiments in elementary and secondary school education under scientific control. There is as much need for scientific experiments in education as there is for such experiments in agriculture or engineering. Although we are spending annually many hundreds of millions of dollars on public education, we have little accurate and definite knowledge about the value of various forms of education and methods of teaching, and we can have little more until provision is made for such scientific experiments as are here indicated. With a comparatively small amount of money the bureau might obtain the cooperation of individuals, institutions, and boards of education in making important investigations and experiments in education not otherwise possible without much larger expenditures.

19. Means to enable the Bureau of Education to cooperate with State and county school officers in establishing and maintaining model rural schools for the purpose of demonstrating the value of such forms of rural school organization, management, courses of study, and methods of teaching as may appear to be most desirable to be incorporated in the rural schools of the several States and communities of the United States.

20. A larger appropriation to enable the Secretary of the Interior, in his discretion and under his direction, and with the advice and cooperation of the Public Health Service, to provide for the medical and sanitary relief of the Eskimos, Aleuts, Indians, and other natives of Alaska. Careful investigations made with the cooperation of the Public Health Service have shown the necessity of immediate provision for the care of the health of the natives of this Territory and for the eradication of communicable diseases now prevalent in different sections of the Territory which, if not put under immediate control, will soon destroy the lives of many of these people and spread among the white settlers. The addition of $12,500 to the appropriation for this purpose for the fiscal year, making the total of $62,500 for this purpose, has enabled the bureau to do more for the health of these people than ever before, but much still remains to be done. To do what is needed will require an annual appropriation of at least $100,000. An appropriation of $82,500 will be asked for the next fiscal year.

21. The bureau should be authorized to sell some of the 4,000 reindeer belonging to the Government and use the proceeds in distributing the remainder to those sections of northwest Alaska where they can be herded profitably, but where there are none now. The Alaska reindeer service, which was begun in a small way a little more than 20 years ago, has now reached large proportions, and has accomplished much for the support and for the education and civilization of the natives in the northwestern part of the Territory. The bureau wishes to extend at once the distribution of reindeer in the sections in which reindeer may be herded profitably, to give all the natives of this section the advantage which has already come to those living in settlements to which reindeer have been sent, and to com-

plete this work so there may not be need for a continuation of the appropriation for this purpose. The annual appropriation of $5,000, much of which must be used for other purposes than distribution of reindeer, is not sufficient to enable the bureau to proceed with this distribution as rapidly as it should. Authority to sell male deer and use the proceeds for this purpose would hasten the distribution without additional cost to the Government.

22. The time has come when the natives in all parts of Alaska should be assisted and directed in the establishment and development of industries of their own, which will give them remunerative employment through much of the time in which they are now more or less idle and by which they may make for themselves a better support and gradually take over the larger part of the cost of their own schools and medical attendance. The success of the reindeer industry in the northwestern part of the Territory, and of experiments in other industries, on a smaller scale, in other parts of the Territory would seem to justify the use of a few thousand dollars a year for this purpose for the next 10 or 15 years. The sooner these people are made wholly self-supporting, the less will be the final cost of their support and education to the Government. A few thousand dollars judiciously expended for this purpose now will save hundreds of thousands of dollars later.

23. The annual estimates for appropriations for "education of natives in Alaska," for "reindeer in Alaska," and for "medical attendance of natives in Alaska," are usually put in the sundry civil bill, which on alternate years, in which the long session of Congress meets, is not considered until near the end of the fiscal year, and sometimes not until after the beginning of the next; but supplies for certain parts of Alaska must be shipped from Seattle in June or early in July in order to reach their destination. Buildings for schools or hospitals can be erected much better and at less cost in the summer than in the winter, and materials for such buildings should be shipped as early in the year as possible. Contracts with teachers should be made when possible in May and June. It is, therefore, recommended that these estimates be considered separately or in some other bill which is likely to receive final consideration earlier in the year.

24. For the printing of the annual report of the commissioner and the bulletins and circulars which should issue from the bureau each year there should be available not less than $100,000. The growing importance of education in our national life, the large expenditures for schools and other agencies of education, the increasing extension and differentiation of education to meet the new and increasing needs of industrial and civic life have created a demand for such information as is contained in these publications in many and widely varied fields of education. From no other source can this demand be supplied than from this bureau, and from this bureau it should be met as fully as possible. This will require the printing of a large number of bulletins each year, and many of these should be printed in much larger editions. The limit of 12,500 copies for any edition of a bulletin should be removed, so that it may be printed in such numbers as in the judgment of the Secretary of the Interior may be necessary. Fifty or a hundred thousand school officers can not be supplied from

an edition of 12,500 copies of a bulletin on a subject in which they are all equally interested.

25. For the work which the bureau now does more room is needed, and still more will be needed as its staff of experts and clerks is increased. There is now need for more and better arranged space for the bureau's library, which is increasing from year to year. The Nation needs an educational museum, a kind of perpetual educational exhibit in which there may be found at any time, properly arranged and catalogued, typical courses of study, samples of school furniture and equipment of all kinds, specimens of school work, plans and photographs of buildings and grounds, and whatever else will be helpful in enabling students of education and school officers and teachers to gain an accurate and comprehensive knowledge of purposes, methods, and results of education in this and other countries, and assist them in forming ideas for the improvement of their own schools and school work. This museum should, of course, be under the direction of the Bureau of Education and should constitute an essential part of its equipment. The work of the Federal Board for Vocational Education, of which the Commissioner of Education is a member, is so closely related to that of this bureau that it would add to the efficiency both of the board and of the bureau if they were housed in the same building, so that they might have easy access to the same library and communicate easily with each other; and there are other important activities of the Government which could be carried on more effectively under the same conditions. I, therefore, renew the recommendations contained in previous statements that plans be considered at once for the erection of a building that will afford ample room for the work of the bureau and allied activities of the Government, house the bureau's library, and furnish ample room for such collections of materials as those mentioned above.

Respectfully submitted.

P. P. Claxton, *Commissioner.*

The Secretary of the Interior.

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REPORT OF THE DIRECTOR OF THE UNITED STATES GEOLOGICAL SURVEY.

REPORT OF THE DIRECTOR OF THE UNITED STATES GEOLOGICAL SURVEY.

GEORGE OTIS SMITH, *Director.*

The appropriations for the work of the United States Geological Survey for the fiscal year 1916–17 comprised items amounting to $1,605,520. The plan of operations as approved by the Secretary of the Interior included geologic surveys in the United States and Alaska, reconnaissance and detailed, of 40,937 square miles, topographic surveys of 32,245 square miles, stream gaging at 1,197 stations, the classification of public lands to an amount of more than 18,000,000 acres, and the collection of statistics of production and consumption from more than 90,000 producers, covering more than 75 mineral products. During the year 203 scientific and economic reports were published, and at the end of the year the Survey members holding appointments from the Secretary numbered 934, an increase of 62.

SPECIAL FEATURES.

WAR WORK.

During the greater part of the year the activities of the Geological Survey were concentrated upon lines of investigation connected with military and industrial preparedness. This mobilization has included preparation of special reports for the use of the War and Navy departments and the Council of National Defense, the making of military surveys, the printing of military maps and hydrographic charts, and the contribution of engineer officers to the Reserve Corps.

Early in the present calendar year the Survey transmitted to the War Department a series of 23 summary reports on the underground water supplies and the soil-drainage features of the areas along the Mexican border and the Gulf and Atlantic coasts. Several State surveys cooperated with the Federal geologists in the preparation of these geologic and hydrologic reports, which were transmitted in duplicate to the War College and the Engineer Corps, for use in the selection of cantonment sites. By request of the War and Navy departments special local investigations of water-supply and drainage possibilities of reservations have been made, including the problem of supplying troops with water on the island of Oahu.

In connection with the minerals that have assumed special significance under war conditions, the work of the Geological Survey has been both expanded and made more intensive. Results already at hand as the product of years of field and office investigation have been made available in special reports published for the information of the general public or prepared for the immediate use of some official commission, committee, or bureau. Geologic field work has been concentrated on the essential mineral resources, especially those of which the domestic supply falls short of present demands. Every oil geologist available is at work in the petroleum regions where increased production can be expected to follow geologic exploration. Other geologists have been assigned to the search for commercial deposits of the "war minerals"—manganese, pyrite, platinum, chromite, tungsten, antimony, potash, and nitrate.

An increasing appreciation of the military value of the topographic surveys in progress and the desire to increase this special use of the topographic corps led in January, 1917, to the formation of the division of military surveys in the topographic branch. In March the recognition of the urgent need of military surveys resulted in the plans for field work being made to conform wholly to a program drawn up by the General Staff of the Army. This program was submitted on March 26 and by the end of June 8,192 square miles of the areas had been surveyed. These military surveys will be continued as speedily as possible with the decreasing force of topographers available for this work in the United States.

War conditions not only diverted practically all the activities of the topographic branch to the urgent needs of the War Department for military surveys but also brought about the commissioning of the majority of the technical personnel of this branch as reserve officers in the Corps of Engineers, United States Army. This created a deficiency in the force of engineers available for topographic duty, and new sources of personnel became necessary. Permission has been obtained from the Civil Service Commission to appoint topographic field assistants without status in the classified service. Such appointments began on July 2, 1917, and by the end of September 58 men were thus appointed by the Survey, of whom 20 were assigned directly to topographic parties in the field and 38 reported at Washington for observation and training as to their special fitness for the various details of duty in the field. To judge of this adaptability, the candidates have been tested by actual field work in the near vicinity of Washington, under close supervision and intensive instruction.

A report on the use of the panoramic camera in topographic surveying, already in progress, was given special military value by the addition of a chapter on the application of photogrammetry to aerial surveys. The author, Capt. J. W. Bagley, Engineer Officers' Reserve

Corps, has also served as a member of the airplane mapping committee of the National Advisory Committee for Aeronautics, his time being devoted chiefly to the perfection of a camera specially adapted to airplane use. In this work Capt. Bagley is assisted by F. H. Moffit.

A large contribution to the military service is made by the map-printing establishment of the Survey. This plant has been available for both confidential and urgent work, and during the year 96 editions of maps needed for military use have been printed for the War Department and 906 editions of charts for the Navy Department. Other lithographic work was in progress at the end of the year, some of it of a complicated character.

In some respects the largest contribution of the Survey has been the group of specially trained engineers who have been commissioned in the Engineer Officers' Reserve Corps, this group including at the end of the fiscal year 1 geologist, 7 hydrographic engineers, and 61 topographic engineers. On October 1, 1917, the number of Survey representatives holding commissions aggregated 79, of whom 37 are either already in France or have been selected for service there—7 majors, 8 captains, and 22 lieutenants. The other officers—9 majors, 10 captains, and 23 lieutenants—are in active service and, pending other orders, instructed by the War Department "to report to the Director of the Geological Survey for duty in connection with the military surveys in progress." Two of the officers in France have been appointed on Gen. Pershing's staff, Maj. Alfred H. Brooks as geologic engineer and Maj. Glenn S. Smith as topographic engineer. These appointments leave the Geological Survey without chiefs of two important divisions—the division of Alaskan mineral resources and the division of military surveys, respectively. Maj. Frank Sutton and Maj. C. H. Birdseye, who are among those ordered to France, have left the Atlantic and Rocky Mountain divisions without administrative chiefs during the war.

DEVELOPMENT OF THE MINERAL INDUSTRY.

Clarence King, the first Director of this Survey, emphasized in the administrative report of 1880 the desirableness of the Federal investigation of the mineral wealth of the country and of the industry based thereon. The advantage of this type of governmental assistance to American enterprise has never been greater or more evident than during the war period that has brought about so great an expansion of the productive capacity of mine and smelter. The large domestic industrial demands for the mineral fuels and the more important metals have been met by rapidly increased output and a larger excess made available for export. In minor minerals what had formerly been imported has been replaced by material of domestic

origin. All this expansion and new development has been profitable in a national sense. America is stronger because of this larger utilization of the useful minerals.

The current geologic and statistical work of the Survey both records the results already attained and indicates the deficiency of supply not yet remedied. For a large group of "war minerals" even the several-fold increased production is not sufficient to meet the increased consumption. A speeding up has naturally followed under these conditions, but plainly the pace has not yet been reached that our natural resources and our engineering genius would seem to justify in time of emergency.

Whoever studies the mineral resources of the United States and the industries built thereon must realize that in a time of need like the present year production rather than price is the matter of prime importance; that a high price may both stimulate production and increase available reserves; that home production will result in transportation savings that are in reality a national benefit of practical value comparable with the theoretical advantage of industrial independence; and that expansion of productive capacity is possible under war conditions only as both consumer and producer can adjust their projects to the conditions that will prevail after the war, as well as to the needs of the present emergency. Illustrations of these four propositions come at once to mind.

Potash is so essential to chemical industries that a high price has been willingly paid for the small percentage thus needed, and domestic potash has come from sources that would be unproductive under more normal conditions. A potash industry to supply the other 90 per cent of our needs—mainly to fertilize the millions of acres upon which larger demands are being made for foodstuffs and cotton and tobacco—must be based upon resources or methods of recovery permitting lower costs of production.

The increase in reserves, due to higher prices and to improved mining and metallurgic practice, is shown in the case of several of the metals. Whether the margin of profit is increased by raising price or lowering costs, the beneficial tendency is to reduce the grade of ore that can be profitably utilized, and this means increasing the Nation's reserves of ore, and thus placing one industry on a more lasting foundation. This stimulating reaction of profit upon engineering efficiency is the promise of future continuance of the supply of the essential metals, such as copper and iron.

The economy of domestic production wherever possible may be shown in the present manganese situation. The Virginia miner who loads on the cars 4,500 tons of high-grade manganese ore this year is not only contributing to the steel industry that tonnage and receiving therefor compensation at the market price, but he thereby

relieves the country's shipping shortage to the extent of one ship for 38 days, not including the necessary time for loading and unloading the cargo of Brazilian ore.

Finally, the proposition that present expansion of business must take into account the future is almost self-evident, although often overlooked. Opening up pyrite mines must be based upon an assured supply of ore in the ground and an assured demand for the product for a period long enough and at prices high enough to justify the development. It is not enough for the geologist to point out the ore; the acid manufacturer needs to contract both to buy the pyrite and to sell the acid. New development must rest upon a basis of something more than risk, lest expansion of productive capacity involve after-the-war losses that will swallow up war profits.

To make America industrially independent is an aim perhaps even more desirable now than three years ago and possibly also even more of a problem than was then realized.

SPECIAL PUBLICATIONS.

Among the publications of the year several deserve special mention. The entrance of the United States into the war served to increase the already large demand for information concerning the Nation's mineral resources, and a bulletin entitled "Our mineral supplies" (Bulletin 666), was prepared to meet this need. The purpose of this publication is to supplement Bulletin 599, "Our mineral reserves," published in September, 1914. A comparison of this summary of the ability of the mineral industry to meet present-day demands with the earlier and less complete review of the mineral situation serves to make plain the larger degree of national independence which has been attained in the mining, metallurgic, and chemical industries. Twenty geologists have contributed to the present bulletin, which has been published first in separate chapters, each devoted to a "war mineral" or to some mineral product important under present conditions.

Official and general demand for up to date statistics on several of the more important minerals has been met by further response by the geologists and statisticians of the Survey. The monthly statements of railroad movement of coal and coke first issued in August, 1916, were followed in June, 1917, by the compilation of weekly statements of bituminous coal and coke production, with an analysis of causes of change in rate of output. The purpose of these statistics is to serve both the Government and the trade with an authoritative index of industrial conditions.

For similar reasons the Survey began in January the issue of monthly statements of petroleum production and consumption, these statistics showing the quantity of oil moved from field sources, the

quantity delivered to refiners or to consumers, and the amount in storage at the end of each month, for each of the major oil fields east of the Rocky Mountains.

At the request of the War Department a special military map of the vicinity of the Plattsburg training camp was issued in May. The survey of this area was the first purely military mapping done by the topographers of the Geological Survey and included an amount of detail never before undertaken. The area mapped was 90 square miles, with a publication scale of 3 inches to 1 mile and a contour interval of 5 feet. On the printed maps distinctions are made between barbed and smooth wire fences, stone walls, and rail fences, between the broad-leafed timber, the pine forests, and orchards, and between roads of different character, and every telegraph and telephone pole is located, as well as, of course, every building. It is believed that this map compares favorably with the best military maps issued by European countries, and this innovation in topographic work helped materially in fitting the Survey to furnish topographic engineers for service in France.

Work on another map of detailed character also contributed to the training of a large number of Survey topographers in refined, large-scale work, although made for another purpose. This is the map of Washington and vicinity, covering 464 square miles. This map is believed to be the best example in the United States of a map covering a large area of diversified topography which shows the physical characteristics of the country, as well as all the works of man. It was printed in four colors, showing automobile roads in red, and was issued in two editions aggregating 20,000 copies, of which over 15,000 copies have been sold and otherwise distributed.

NEW HOME.

The completion of the new Interior Department office building made it possible for the Survey to occupy its new home in May, 1917. This marks the culmination of the efforts of three Directors of the Survey to procure quarters both adequate for its work and safe for the Survey workers as well as the large accumulation of scientific records. In the Thirty-third Annual Report the general unfitness of the buildings occupied by the Survey was fully discussed, and the extent of the limitations on economy and efficiency thus forced upon the employees pointed out. For nearly a third of a century the privately owned building at 1330 F Street had been enlarged piecemeal as the Federal organization increased the scope and extent of its operations, until overcrowding reached the limit, whether viewed in regard to sanitation, safety, or efficiency. The new building remedies these conditions by providing 50 per cent more floor space,

and all of this space that is devoted to offices, laboratories, or workrooms is well lighted.

The new building was authorized March 4, 1913, ground was broken August 16, 1915, and the building was completed about two years later. The approximate cost was $2,500,000, and, measured by floor space, it is the largest public building in Washington. The statute specified a building of modern office type, and as a public building the Interior Department office building is unique in that the requirements of use for office and laboratory purposes were given first consideration, the architectural features being determined by the size of unit decided upon as best providing for the special uses within the limitations of the appropriation.

The building occupies the whole block bounded by Eighteenth, Nineteenth, E, and F streets NW. and includes approximately half a million square feet of net floor space, accommodating the Office of the Secretary, the General Land Office, the Office of Indian Affairs, the Bureau of Mines, the National Park Service, and the Alaskan Engineering Commission, as well as the Geological Survey, which, with its library and map-printing establishment, occupies nearly one-third of the building. It is believed that this move to a new home will increase efficiency as well as avoid the danger to life and property that has been so long a matter of concern to those interested in this branch of the public service.

ARNOLD HAGUE.

Arnold Hague, one of the senior geologists of this Survey, died May 14, 1917, at the age of 76 years. He graduated at the Sheffield Scientific School of Yale University in 1863 with Clarence King, and later, as a student at Freiburg, he met S. F. Emmons, and both of them joined Clarence King early in 1867 to make the Fortieth Parallel Survey. Ten years later he made official surveys in Guatemala and the following year in China.

At the time of the organization of the United States Geological Survey in 1879 under Clarence King, Arnold Hague was appointed geologist. The results of his work have appeared in Monograph 20, on the geology of the Eureka district in Nevada, and in Monograph 32, on the Yellowstone National Park. For some years he had been engaged in a special study of geysers, and this work, his last and greatest, Mr. Hague leaves practically complete.

In addition to preparing his larger reports, Mr. Hague has contributed to scientific periodicals. He was a fellow of the Geological Society of America, of which he was president in 1910, and of the Geological Society of London, and was a member of many other scientific societies. Several universities in this country and abroad conferred upon him special degrees, but the honor he most highly ap-

preciated was that of being made a member and officer of the National Academy of Sciences.

Mr. Hague was not a ready nor voluminous writer, but his writings were notably exact. He aimed rather to write well and truly than much. Few scientific men in America have had so wide a circle of devoted friends as Arnold Hague.

WORK OF THE YEAR.

PUBLICATIONS.

The publications of the year consisted of 1 annual report, 5 professional papers, 18 separates from 3 professional papers, 23 bulletins, 66 separates from 8 bulletins, 25 water-supply papers, 7 separates from 3 water-supply papers, 55 advance chapters from 2 annual reports on mineral resources, 5 geologic folios, 1 list of publications, 1 list of water-supply papers, 1 service bulletin, pamphlets entitled "Suggestions to authors (third edition)" and "Extracts from the Style Book of the Government Printing Office," a leaflet entitled "Nature and uses of topographic maps," advance statements on copper, lead, and zinc production in 1916, 2 circulars concerning maps and folios, 34 index map circulars, 47 press bulletins, and 12 monthly lists of new publications. The total number of pages in these publications was 17,255.

Brief notices of the publications of the year are given below:

THIRTY-SEVENTH ANNUAL REPORT OF THE DIRECTOR of the Geological Survey to the Secretary of the Interior, for the fiscal year ended June 30, 1916. 1916. 185 pages, 2 plates, 1 text figure.

A detailed account of the work of the Geological Survey during the fiscal year 1916, with a statement of the appropriation made by Congress for the Survey for that year. Under the heading "Special features" the Director discusses the need of economy in science, and shows how, in the several Federal bureaus especially, waste in scientific service can be avoided by cooperation. He also discusses the progress made in the search for potash in the United States, the need for a domestic supply of which has become urgent since the war has cut off the supply from the most abundant source of this material—Germany. The report contains abstracts of the books published by the Survey during the year and a list of the maps issued. The illustrations consist of maps showing areas covered by topographic and geologic surveys and a diagram showing the comparative number of maps sold by the Survey during each month of the fiscal years 1915 and 1916.

PROFESSIONAL PAPER 91. The lower Eocene floras of southeastern North America, by E. W. Berry. 481 pages, 117 plates, 16 text figures.

A comprehensive study of the lower Eocene plant remains of the southern Coastal Plain. The main body of the material examined in preparing the report came from beds embraced in the stratigraphic unit known as the Wilcox group, which comprises littoral and estuarine sediments; the remainder of the material came from strata regarded as the Midway formation, a typically marine series of deposits. Both these floras are of the

greatest importance to the geologist, because they furnish the much-sought means for direct comparison between the plant-bearing formations of the Rocky Mountain province and the marine Tertiary formations of the Atlantic and Gulf waters. The plant-bearing outcrops and the various species are discussed in detail. The book also contains numerous halftone plates showing specimens of the fossil plants.

PROFESSIONAL PAPER 94. Economic geology of Gilpin County and adjacent parts of Clear Creek and Boulder counties, Colo., by E. S. Bastin and J. M. Hill. 1917. 379 pages, 23 plates, 79 text figures.

This book forms the Survey's latest contribution to the investigation of the metalliferous deposits of the Colorado ore belt. It describes the geology of the region in the vicinity of Central City, which lies nearly west of Denver, in the heart of the Front Range of the Rockies. The ores of this region yield gold, silver, copper, and tungsten in commercial quantities, and some iron. Each mine is described in detail and the treatment of the ores is discussed. The book contains numerous illustrations, including topographic and geologic maps of the Central City quadrangle, camera lucida drawings of some specimens of the ores, geologic plans of portions of the mines, and halftone plates showing features of geologic interest.

PROFESSIONAL PAPER 97. Geology and ore deposits of the Mackay region, Idaho, by J. B. Umpleby. 1917. 129 pages, 21 plates, 14 text figures.

Describes in detail the geography and geology of the Mackay region, in southeastern Idaho, north of Snake River. The existence of ore deposits in this region has been known to mining men since 1880. The principal metal recovered is copper, although silver, gold, and lead also occur in the region. It comprises eleven mining districts, all of which are treated separately in this report. At least three of these districts are of more than ordinary promise, and the author gives practical conclusions and suggestions which should aid the prospector in discovering new outcrops of ore. The illustrations consist of a geologic sketch map of the Mackay region, plans and sections of the mines, and halftone and colored plates of specimens of ore.

Parts of Professional Paper 98. Shorter contributions to general geology, 1916, as follows:

PROFESSIONAL PAPER 98–I. A reconnaissance of the Archean complex of the Granite Gorge, Grand Canyon, Ariz., by L. F. Noble and J. F. Hunter. 1916. Pp. 95–113, Pl. XIX, figs. 9–10.

Presents the results of a brief study of the Archean rocks of the Grand Canyon, especially as to their petrographic character, origin, and structure.

PROFESSIONAL PAPER 98–J. North American Upper Cretaceous corals of the genus *Micrabacia*, by L. W. Stephenson. 1916. Pp. 115–131, Pls. XX–XXIII.

Contains systematic descriptions and illustrations of some well-preserved corals of the genus *Micrabacia* from the Atlantic and Gulf Coastal Plain and from the western interior of the United States. The scarcity of specimens of corals of this genus adds to the value of these descriptions.

PROFESSIONAL PAPER 98–K. Some Paleozoic sections in Arizona and their correlation, by F. L. Ransome. 1916. Pp. 133–166, Pls. XXIV–XXXI, figs. 11–14.

Includes a brief introductory outline of the broad topographic features of Arizona, a description of the well-exposed geologic section of the Ray-Globe region, in the central part of the State, as well as of other sections, from the Grand Canyon, in the northwestern part of the State, to Bisbee, near the Mexican border, and a discussion of the correlation of these sections.

PROFESSIONAL PAPER 98–L. The Pliocene Citronelle formation of the Gulf Coastal Plain and its flora, papers by G. C. Matson and E. W. Berry. 1916. Pp. 167–208, Pls. XXXII–XLVII, figs. 15–17.

PROFESSIONAL PAPER 98–M. The Catahoula sandstone and its flora, papers by G. C. Matson and E. W. Berry. 1916. Pp. 209–251, Pls. XLVIII–LX, figs. 15–21.

These papers discuss briefly the general character and relations of the formations named in their titles and describe the fossil plants found in these formations, which occur in the Gulf Coastal Plain of Louisiana, Mississippi, and Alabama.

PROFESSIONAL PAPER 98–N. Mechanics of the Panama Canal slides, by G. F. Becker. 1916. Pp. 253–261, figs. 22–24.

A geophysical study of the Panama Canal slides prepared as a contribution to the report of the committee on this subject appointed by the National Academy of Sciences. The author describes the essential features of the breaks on the Gaillard (Culebra) Cut, and discusses briefly the formation of ruptures, the bulging of the canal bottom, and the effect upon pressure of the form of the banks.

PROFESSIONAL PAPER 98–O. Relations of the Embar and Chugwater formations in central Wyoming, by D. D. Condit. 1916. Pp. 263–270, Pls. LXI–LXIII, figs. 25–26.

In this paper the author shows that the Embar formation, which lies between the Tensleep sandstone and the Chugwater formation, comprises several distinct facies. Each of these facies is considered in detail and some of the formational boundaries in the Big Horn Mountain region are redefined. In connection with the description of the gypsum and associated strata it is suggested that conditions were possibly also favorable for accumulation of salt beds. The chance of finding such deposits down the dip below the surface is believed to be sufficient to merit further investigation.

PROFESSIONAL PAPERS 98–P, Q, R, and S. Contributions to the geology and paleontology of San Juan County, N. Mex.

These papers describe the succession of strata in a part of the San Juan Basin with the purpose of establishing a type section for the formations exposed and of bringing out their relations to the strata immediately above and below. As an aid in identifying the formations, the authors also describe the typical fauna and flora found in them. The papers are as follows:

1 (P). Stratigraphy of a part of the Chaco River valley, by C. M. Bauer. 1916. Pp. 271–278, Pls. LXIV–LXXI, fig. 27.

2 (Q). Vertebrate faunas of the Ojo Alamo, Kirtland, and Fruitland formations, by C. W. Gilmore. 1916. Pp. 279–308, Pls. LXIV, LXXII–LXXVIII, figs. 28–42.

3 (R). Nonmarine Cretaceous invertebrates of the San Juan Basin, by T. W. Stanton. 1916. Pp. 309–326, Pls. LXXIX–LXXXIII.

4 (S). Flora of the Fruitland and Kirtland formations, by F. H. Knowlton. 1916. Pp. 327–353, Pls. LXXXIV–XCI.

PROFESSIONAL PAPER 98–T. The reef-coral fauna of Carrizo Creek, Imperial County, Cal., and its significance, by T. W. Vaughan. 1917. Pp. 355–386, Pls. XCII–CII, figs. 43–46.

A study of the fauna mentioned in the title leading to the conclusion that it is Atlantic and not Pacific in its affinities and that therefore there was interoceanic connection across Central America during upper Oligocene time. In Miocene time this connection was terminated, but the author believes that it was again established in upper Miocene or Pliocene time.

PROFESSIONAL PAPER 100–A. The coal fields of the United States: General introduction, by M. R. Campbell. 1917. Pp. 1–33, Pl. I, figs. 1–3.

The first chapter of an exhaustive report on the coal fields of the United States, to be prepared and published as rapidly as is consistent with accurate work. The object of the report is to furnish authentic information as to the quantity, quality, and geographic distribution of the coal still in the ground and available for use. Each chapter will be made up of papers treating of the coal-bearing areas of a different State, and each paper will be prepared by the geologist most familiar with the fields he describes and best acquainted with the local conditions.

Professional Paper 100–A discusses the ranks of coal and the classification of the coal areas in this country. It contains a large lithographed map of the United States showing the location of the coal fields, and so colored as to indicate the class of the coal in each field.

PROFESSIONAL PAPER 102. The inorganic constituents of marine invertebrates, By F. W. Clarke and W. C. Wheeler. 1917. 56 pages.

This paper gives the results of chemical analyses of certain fossil marine invertebrates with the object of determining just what substances each class of these organisms has contributed to the marine sediments which now form so large a part of the rocks of the earth. The organisms analyzed include Foraminifera, sponges, corals, echinoderms, Bryozoa, brachiopods, and mollusks, and the analyses show that their shells or skeletons contain silica, iron, lime, magnesia, phosphorus, and sulphur, as well as other constituents.

PROFESSIONAL PAPER 103. *Brachyceratops*, a ceratopsian dinosaur from the Two Medicine formation of Montana, with notes on associated fossil reptiles, by C. W. Gilmore. 1917. 45 pages, 4 plates, 57 text figures.

This paper gives a complete and detailed description of the skeletal anatomy of *Brachyceratops montanensis*, an extinct reptile whose fossil remains have been found in exposures of the Two Medicine formation on the Blackfeet Indian Reservation, Mont. This reptile was more than 6 feet in length and 2 feet in height and lived in late Mesozoic time. The paper is illustrated by halftone plates giving skeletal and life restorations of *Brachyceratops* and text figures picturing in detail the different parts of its bony structure.

Parts of Professional Paper 108. Shorter contributions to general geology, 1917, as follows:

PROFESSIONAL PAPER 108–A. Baked shale and slag formed by the burning of coal beds, by G. S. Rogers. 1917. Pp. 1–10, Pls. I–III.

In this paper the author discusses the causes of the burning of coal beds and its general effect on the overlying strata. The natural slags formed by this burning vary widely in mineral composition and offer a fertile field for petrologic investigation. The paper is illustrated by photomicrographs of two kinds of slag and a halftone plate showing the effects of burning coal beds in eastern Montana.

PROFESSIONAL PAPER 108–B. The Newington moraine, Maine, New Hampshire, and Massachusetts, by F. J. Katz and Arthur Keith. 1917. Pp. 11–29, Pls. IV–XII, fig. 1.

Describes a recessional moraine now represented by several segments disposed along a sinuous course of 60 miles near the Atlantic coast from Saco, Maine, to Newbury, Mass. This moraine is the result of the accumulation of glacio-fluvial detritus discharged directly into the sea, which

in places has given it the form of broad, flat, delta-like plains of sand and gravel. The author concludes that the moraine belongs to the Wisconsin substage of the Pleistocene epoch.

PROFESSIONAL PAPER 108–C. A comparison of Paleozoic sections in southern New Mexico, by N. H. Darton. 1917. Pp. 31–55, Pls. XIII–XXI, figs. 2–15.

Presents the broader features of the stratigraphy of southern New Mexico, with especial reference to the relations of the Paleozoic rocks. The principal formations are shown in columnar sections, and their distribution is indicated on a map of part of New Mexico and adjoining regions.

PROFESSIONAL PAPER 108–D. Wasatch fossils in so-called Fort Union beds of the Powder River basin, Wyo., and their bearing on the stratigraphy of the region, by C. H. Wegemann. 1917. Pp. 57–60, Pls. XXII–XXIII, figs. 16.

Discusses the age of certain Tertiary coal-bearing rocks in the Powder River basin, a broad structural basin in northeastern Wyoming bounded on three sides by mountain uplifts. These rocks, which are the uppermost of three fresh-water formations overlying the Fox Hills sandstone, have heretofore been classified as Fort Union, but after an examination of their fossils, which this paper describes, the author shows them to be Wasatch and identifies the formation immediately below them as Fort Union.

PROFESSIONAL PAPER 108–E. Geologic history indicated by the fossiliferous deposits of the Wilcox group (Eocene) at Meridian, Miss., by E. W. Berry. 1917. Pp. 61–72, Pls. XXIV–XXVI, figs. 17–18.

Describes two newly discovered fossil plants contained in a collection made at Meridian, Miss., in the spring of 1916. These plants form important additions to the flora of the Wilcox group, and the outcrop in which they occur furnishes new evidence of the unconformity between the lower Eocene Wilcox group and the middle Eocene Claiborne group.

BULLETIN 621. Contributions to economic geology (short papers and preliminary reports), 1915, Part II, Mineral fuels; M. R. Campbell and David White, geologists in charge. 1916. vii, 375 pages, 25 plates, 17 text figures, 2 inserts.

This bulletin includes 16 brief reports of two classes—(1) short papers giving comparatively detailed descriptions of occurrences that have economic interest but are not of sufficient importance to warrant a more extended description; (2) preliminary reports on economic investigations the results of which are to be published later in more detailed form. These papers are such only as have a direct economic bearing, all topics of purely scientific interest being excluded. Each paper was issued separately as an advance chapter as soon as it was ready. A list of the papers arranged according to subjects follows:

Petroleum and natural gas.

The Healdton oil field, Carter County, Okla., by C. H. Wegemann and K. C. Heald.

The Loco gas field, Stephens and Jefferson counties, Okla., by C. H. Wegemann.

The Duncan gas field, Stephens County, Okla., by C. H. Wegemann.

A reconnaissance in Palo Pinto County, Tex., with special reference to oil and gas, by C. H. Wegemann.

Possibilities of oil in the Porcupine dome, Rosebud County, Mont., by C. F. Bowen.

The Lawton oil and gas field, Okla., by C. H. Wegemann and R. W. Howell.

Anticlines in the Clinton sand near Wooster, Wayne County, Ohio, by C. A. Bonine.

A reconnaissance for oil near Quanah, Hardeman County, Tex., by C. H. Wegemann.

Oil and gas near Basin, Big Horn County, Wyo., by C. T. Lupton.

Geology and oil prospects of Cuyama Valley, Cal., by W. A. English.

Structure of the Berea oil sand in the Summerfield quadrangle, Guernsey, Noble, and Monroe counties, Ohio, by D. D. Condit.

Structure of the Berea oil sand in the Woodsfield quadrangle, Belmont, Monroe, Noble, and Guernsey counties, Ohio, by D. D. Condit.

Coal.

Field apparatus for determining ash in coal, by C. E. Lesher.

The Orofino coal field, Clearwater, Lewis, and Idaho counties, Idaho, by C. T. Lupton.

Geology and coal resources of northern Teton County, Mont., by Eugene Stebinger.

Analyses of coal samples from various parts of the United States, by M. R. Campbell and F. R. Clark.

BULLETIN 624. Useful minerals of the United States, compiled by F. C. Schrader, R. W. Stone, and Samuel Sanford. 1917. 412 pages.

A thoroughly revised edition of Bulletin 585 (published in 1914) greatly enlarged and brought up to date. Like the earlier work, the present one gives concisely the location, by States and counties, of the principal deposits of useful minerals and includes a glossary showing the composition and character of each mineral, the location of its principal deposits, and its chief uses. In the revision 160 mineral names have been added to the glossary and about 1,000 new localities of mineral deposits are listed. As a mineral directory this bulletin will be useful to scientific bureaus and educational institutions that deal with inquiries from the general public concerning commercial mineralogy, as well as to the prospector, miner, manufacturer, business man, and student of economic conditions.

BULLETIN 625. The enrichment of ore deposits, by W. H. Emmons. 1917. 530 pages, 7 plates, 29 text figures.

This paper is an amplification of an earlier Survey bulletin by the same author on the enrichment of sulphide ores (Bulletin 529). It is a discussion of representative deposits, especially of the paragenesis of their ores and of the principles that underlie the processes of enrichment. These principles are already fairly well understood and have proved to be of considerable economic value as applied to the development of many mineral deposits. The book is illustrated by halftone plates of specimens of enriched ores and diagrams, cross sections, and projections of lodes and ore bodies which exemplify the principles of enrichment.

BULLETIN 627. The lignite field of northwestern South Dakota, by D. E. Winchester, C. J. Hares, E. R. Lloyd, and E. M. Parks. 1916. 169 pages, 11 plates, 3 text figures.

This report embraces the results of geologic examinations made during the summers of 1911 and 1912 for the purpose of classifying as coal or noncoal land a large tract of public land in Perkins and Harding counties, S. Dak. This tract is a rectangular area of about 4,900 square miles and includes nearly all the valuable lignite of the State. The authors give a brief description of the geography and geology of the area as a whole and

detailed descriptions of the coal beds by townships. The illustrations consist mainly of geologic maps of Harding and Perkins counties and lignite sections in these counties.

BULLETIN 630. The Chisana-White River district, Alaska, by S. R. Capps. 1916. 130 pages, 19 plates, 9 text figures.

This report deals with that part of Alaska which is drained by White and Chisana rivers and describes in detail the gold placers thus far developed in the region. The author presents evidence to show that these placers have been formed because of certain local conditions which are not likely to be repeated in other parts of the field and concludes therefore that the outlook for finding other placer deposits in this intensely glaciated region is not favorable. The evidence of wide distribution of copper and gold mineralization, however, gives promise that lode mining may be successful in this field provided it is made accessible by a railroad. The book contains topographic and geologic maps of the district, sketch maps and diagrams showing distribution of timber and geologic structure, and many halftone plates illustrating geologic features.

BULLETIN 631. The Yukon-Koyukuk region, Alaska, by H. M. Eakin. 1916. 88 pages, 10 plates, 2 text figures.

Gives the results of a reconnaissance survey in the Yukon-Koyukuk region made by the author in 1913. Although the economic results of this investigation are largely negative on account of the paucity of mineral deposits in the region, the intrusive granites to which the mineralization is due are widely distributed and thus afford some hope that auriferous deposits may still be discovered. The author presents also an analysis of the problems relating to the origin of the drainage system of the middle Yukon country.

BULLETIN 635. Spirit leveling in Georgia, 1896 to 1914, inclusive; R. B. Marshall, chief geographer. 1916. 60 pages, 1 plate.

BULLETIN 636. Spirit leveling in Arkansas, 1896 to 1915, inclusive; R. B. Marshall, chief geographer. 1916. 56 pages, 1 plate.

BULLETIN 637. Spirit leveling in Texas, 1896 to 1915, inclusive; R. B. Marshall, chief geographer. 1916. 254 pages, 1 plate.

BULLETIN 638. Spirit leveling in New Mexico, 1902 to 1915, inclusive; R. B. Marshall, chief geographer. 1916. 112 pages, 1 plate.

BULLETIN 639. Spirit leveling in Mississippi, 1901 to 1915, inclusive; R. B. Marshall, chief geographer. 1916. 80 pages, 1 plate.

Reports on precise and primary leveling in the States named, showing the exact altitude above sea level of a great many places. These elevations have been adjusted by the United States Coast and Geodetic Survey from precise leveling. The work in Texas during 1902, 1903, 1909, and 1910 was done in cooperation with the State. Each bulletin contains a halftone plate showing Geological Survey designs for bench marks.

BULLETIN 640. Contributions to economic geology (short papers and preliminary reports), 1916, Part I, Metals and nonmetals except fuels; F. L. Ransome and H. S. Gale, geologists in charge. 1917. viii, 255 pages, 9 plates, 24 text figures.

This bulletin includes 13 papers on investigations of mineral deposits except fuels in the United States in 1916. These papers are of the two classes indicated for Bulletin 621 (p. 18). Their titles, arranged according to subjects, are given on page 21.

Gold and silver.

Reconnaissance of the Conconully and Ruby mining districts, Wash., by E. L. Jones, jr.

Lode mining in the Quartzburg and Grimes Pass porphyry belt, Boise Basin, Idaho, by E. L. Jones, jr.

The Golden Arrow, Clifford, and Ellendale districts, Nye County, Nev., by H. G. Ferguson.

The Gold Log mine, Talladega County, Ala., by E. S. Bastin.

Placer deposits of the Manhattan district, Nev., by H. G. Ferguson.

Lead and zinc.

Notes on the promontory district, Utah, by B. S. Butler and V. C. Heikes.

Rare metals.

Molybdenite near Ramona, San Diego County, Cal., by F. C. Calkins.

An occurrence of nickel ore in San Diego County, Cal., by F. C. Calkins.

Tin ore in northern Lander County, Nev., by Adolph Knopf.

Tungsten deposits of northern Inyo County, Cal., by Adolph Knopf.

Miscellaneous.

Some manganese mines in Virginia and Maryland, by D. F. Hewett.

Gypsum in the southern part of the Big Horn Mountains, Wyo., by C. T. Lupton and D. D. Condit.

The Garrison and Philipsburg phosphate fields, Mont., by J. T. Pardee.

Parts of Bulletin 641, Contributions to economic geology, 1916, Part II, as follows:

Bulletin 641–B. The oil and gas geology of the Foraker quadrangle, Osage County, Okla., by K. C. Heald. 1916. Pp. 17–47, Pls. II–III, figs. 1–10.

A brief account of the geography and geology of the Foraker quadrangle. The author describes in detail those strata which are valuable as key horizons, gives the probable positions of oil sands, portrays the geologic structure by map and stereogram, and describes fully those anticlines which he believes favorable for the accumulation of oil and gas. In conclusion he gives specific recommendations for prospecting and sets forth his reasons for believing that accumulations of oil and gas are to be found in this area.

Bulletin 641–C. Possibilities of oil and gas in north-central Montana, by Eugene Stebinger. 1916. Pp. 49–91, Pls. IV–VII, figs. 11–12.

This paper summarizes all the available data concerning the possible occurrence of oil and gas in an area of about 22,000 square miles in north-central Montana, extending from the latitude of Great Falls northward to the international boundary, and points out a number of anticlines and other structural features in this area which seem to be favorable for prospecting. The illustrations consist of geologic sketch maps and sections showing oil and gas prospects and structural conditions.

Bulletin 641–D. Structure of the Vicksburg-Jackson area, Miss., with special reference to oil and gas, by O. B. Hopkins. 1916. Pp. 93–120, Pl. VIII.

Describes briefly the geology of the Vicksburg-Jackson district, laying special stress on those features which indicate a possible store of oil and

gas there. The author points out which of the areas that have been examined by the Survey are considered favorable and which unfavorable for the accumulation of oil. A map of the district accompanies the report.

BULLETIN 641–E. An anticlinal fold near Billings, Noble County, Okla., by A. E. Fath. 1916. Pp. 131–138, Pl. IX, fig. 1.

Discusses the possibilities of developing an oil and gas field on a certain anticline near Billings, Okla., and gives the logs of several wells that have been drilled in this vicinity.

BULLETIN 641–F. Oil shale in northwestern Colorado and adjacent areas, by D. E. Winchester. 1916. Pp. 139–198, Pls. X–XIX, figs. 13–14.

Gives the results of an examination of the Green River formation in Colorado and Utah to determine the richness of the oil shale of that formation. Contains data showing the quantity and quality of the oil that may be distilled from the richer beds of shale, the number of such beds at the different localities examined, and the general distribution of the shale throughout northwestern Colorado and adjacent parts of Utah and Wyoming.

BULLETIN 641–G. Geology of the Upper Stillwater Basin, Stillwater and Carbon counties, Mont., with special reference to coal and oil, by W. R. Calvert. 1916. Pp. 199–214, Pls. XX–XXI.

In this paper the author compares the geology of the Upper Stillwater Basin, Mont., with that of the Red Lodge district, already studied, in order to show the relation between the coal-bearing rocks of the two areas. He concludes that while the coal in the Upper Stillwater Basin compares favorably in quality with that in the Red Lodge district, the available tonnage is much less. Lack of adequate transportation facilities at present in the Upper Stillwater field also limits its production to the local demand.

BULLETIN 641–H. Geology of the Hound Creek district of the Great Falls coal field, Cascade County, Mont., by V. H. Barnett. 1916. Pp. 215–231, Pl. XXII, fig. 15.

Describes the geologic formations and structure in the Hound Creek district with reference to the occurrence or absence of coal-bearing rocks. Concludes that development of the coal deposits will depend entirely on the local demand, not only because of the poor transportation facilities of the field but also because the coal occurs in too small quantity and is too impure to justify the establishment of a plant to mine coal for shipment.

BULLETIN 641–I. Anticlines in central Wyoming, by C. J. Hares. 1916. Pp. 233–279, Pl. XXIII, figs. 16–34.

BULLETIN 641–J. Anticlines in the Blackfeet Indian Reservation, Mont., by Eugene Stebinger. 1917. Pp. 281–305, Pls. XXIV–XXV, fig. 35.

These two papers give brief accounts of the geologic formations in the districts mentioned in their titles and detailed descriptions of the anticlines and other folds that appear to contain oil or gas. The illustrations for each paper include a map showing the anticlines described in that paper. In addition, Bulletin 641–I contains geologic sections through the anticlines and Bulletin 641–J a geologic sketch map of Blackfeet Indian Reservation, showing sections and wells drilled for oil or gas.

BULLETIN 641–K. Coals in the area between Bon Air and Clifty, Tenn., by Charles Butts. 1917. Pp. 307–310, fig. 36.

This paper was prepared in order to correct a possible misunderstanding regarding the probable coal resources of a small area in Tennessee between Bon Air and Clifty. This area is represented on an economic-geology map which forms part of the Pikeville folio (Geologic Folio 21),

issued by the Survey in 1894. The space was left unshaded on that map merely to express a lack of knowledge concerning the coal resources of the area, and not, as some readers have supposed, to indicate that it contains no workable coal beds. Present knowledge seems to justify the conclusion that two coal beds underlie this area, but their workable portions are so situated that investment or mining in the area should be preceded by careful and thorough prospecting.

BULLETIN 641–L. Oil resources of black shales of the eastern United States, by G. H. Ashley. 1917. Pp. 311–323.

Gives the results of distillation tests of samples of black shale from six States east of the Mississippi, especially as concern the oil content of the shales. Black shales have long been regarded as a possible source of oil, but the prohibitive cost of extracting the oil has so far prevented the process from being practical. The great demand for oil, however, created by the war, and the knowledge that the yield from the present known fields must sooner or later decline have renewed interest in oil-bearing shales and led to definite exploratory work on them.

BULLETIN 642. Mineral resources of Alaska—report on progress of investigations in 1915, by A. H. Brooks and others. 1916. 379 + x pages, 11 plates, 14 text figures.

This volume, which is made up of twelve papers by nine authors, is the twelfth of a series of annual bulletins treating of the mining industry of Alaska and summarizing the results achieved during the year in the investigation of the mineral resources of the Territory.

The arrangement and manner of treatment in this volume are the same as in those previously issued. The first paper deals with administrative matters, the second is a general summary of the mining industry, and the remainder deal more specifically with the economic geology of certain districts arranged geographically from south to north. In the geologic papers emphasis is laid on the conclusions having immediate interest to the miner. The papers were first published separately, in small editions. Their titles are given below:

Preface, by A. H. Brooks.
Administrative report, by A. H. Brooks.
The Alaskan mining industry in 1915, by A. H. Brooks.
Mining developments in southeastern Alaska, by Theodore Chapin.
Water-power investigations in southeastern Alaska, by G. H. Canfield.
Mineral resources of the upper Chitina Valley, by F. H. Moffit.
Mining on Prince William Sound, by B. L. Johnson.
The Turnagain-Knik region, by S. R. Capps.
Gold mining in the Willow Creek district, by S. R. Capps.
Preliminary report on the Tolovana district, by A. H. Brooks.
Exploration in the Cosna-Nowitna region, by H. M. Eakin.
Mineral resources of the Ruby-Kuskokwim region, by J. B. Mertie, jr., and G. L. Harrington.

BULLETIN 643. Spirit leveling in South Dakota, 1896 to 1915, inclusive; R. B. Marshall, chief geographer. 1916. 100 pages, 1 plate.

Gives the results of primary and precise leveling in South Dakota in the years mentioned, showing the altitude above sea level of more than 1,000 places. Elevations are based on heights of bench marks along precise level lines of the Coast and Geodetic Survey as adjusted in 1912, and on checked primary leveling of the Missouri River Commission. The book contains a halftone plate showing Geological Survey designs for bench marks.

BULLETIN 644. Triangulation and primary traverse, 1913–1915; R. B. Marshall, chief geographer. 1916. 655 pages, 2 plates.

Gives the results of triangulation and primary traverse in the United States during the years 1913, 1914, and 1915, listing 930 triangulation stations and 7,356 traverse stations, nearly all computed on North American datum. Illustrated by a map of the United States showing the condition of astronomic location and primary control to January 1, 1916, and a halftone plate showing Geological Survey bench marks. Issued first in 18 advance chapters, each covering one State or a group of adjoining States.

BULLETIN 645. Bibliography of North American geology for 1915, with subject index, by J. M. Nickles. 1916. 144 pages.

A list, arranged alphabetically by authors' names, of publications on the geology of the Continent of North America and adjacent islands, also Panama and the Hawaiian Islands, issued in 1915. The book is indexed and contains lists of chemical analyses reported, and minerals, rocks, and geologic formations described.

BULLETIN 646. Spirit leveling in North Carolina, 1896 to 1914 inclusive; R. B. Marshall, chief geographer. 1916. 71 pages, 1 plate.

Gives the results of primary and precise leveling in North Carolina in the years mentioned, showing the altitude above sea level of more than 800 places. Some of these elevations have been adjusted by the United States Coast and Geodetic Survey from precise leveling. The work during 1896 and from 1902 to 1910, inculsive, was done in cooperation with the State. The bulletin contains a halftone plate showing Geological Survey bench marks.

BULLETIN 648. Notes on mining districts in eastern Nevada, by J. M. Hill. 1916. 214 pages, 6 plates, 18 text figures.

The last of a series of reconnaissance reports on the geology and ore deposits of Nevada, giving special attention to the less known and comparatively undeveloped and inaccessible districts. Gives a general outline of the geology of eastern Nevada, including a brief discussion of the nature and occurrence of the ore deposits of the region, as a whole, and detailed descriptions of individual mining districts. The illustrations include a map of eastern Nevada, showing the location of some of the districts described and sketch maps of the districts themselves.

BULLETIN 649. Antimony deposits of Alaska, by A. H. Brooks. 1916. 67 pages, 3 plates, 3 text figures.

A general account, so far as the known facts permit, of the stibnite lodes of Alaska, followed by more detailed descriptions of the principal antimony-bearing districts. Until recently the comparatively small consumption and low price of antimony have not encouraged the development of the Alaska stibnite deposits, although this ore, which bears the sulphide of antimony and is the principal source of the metal, has been noted in 67 localities in the Territory. The present unusual demand for antimony, however, has led to shipments of the ore from Alaska and renewed interest in the development of the Alaska mines. The illustrations consist of maps showing the distribution of antimony deposits and lodes and the location of stibnite mines and prospects.

BULLETIN 650. Geographic tables and formulas (fourth edition); compiled by S. S. Gannett. 1916. 388 pages, 8 text figures.

Includes coordinates for the projection of maps on different scales, areas of quadrilaterals of the earth's surface of different extent, tables of logarithms, computations of geodetic positions, and other tables and formulas used in making maps.

BULLETIN 652. Tungsten minerals and deposits, by F. L. Hess. 1917. 85 pages, 25 plates, 4 text figures.

Gives the known general facts about tungsten, describes the minerals in which it is found and the kinds of deposits from which these minerals have been obtained, and shows, by numerous illustrations, some in the natural colors, the appearance of typical specimens of the various tungsten minerals. The paper should be of interest not only to the prospector and miner but also to those who have no particular knowledge of minerals.

BULLETIN 653. Chemical relations of the oil-field waters in San Joaquin Valley (preliminary report), by G. S. Rogers. 1917. 119 pages, 7 text figures.

A study of the chemistry of the waters of the San Joaquin Valley oil fields, based on several hundred analyses of water from different depths and leading to the following conclusions: (1) That oil-field water is not necessarily salty; (2) that sulphate diminishes in amount as the oil zone is approached and finally disappears; (3) that the concentration of carbonate increases as the oil zone is approached; and (4) that the horizon, with respect to the oil zone, at which these alterations take place is different in each field. The author first presents the evidence on which the foregoing conclusions are based and discusses the interpretation of water analyses and their value from the operator's point of view, and then discusses also the chemical relations of water and oil. He hopes that this preliminary presentation will show the importance of experimental geochemical work on the interaction of the organic constituents of oils and the inorganic substances found in the oil-field waters.

BULLETIN 657. The use of the panoramic camera in topographic surveying, with notes on the application of photogrammetry to aerial surveys, by J. W. Bagley. 1917. 88 pages, 15 plates, 22 text figures, 1 insert.

Describes the field and office instruments used in topographic surveys of certain parts of Alaska in which the ordinary plane-table instruments were supplemented by the panoramic camera, shows the way they were used, and presents some of the results obtained. The method was first tried out in Alaska because that Territory contains a greater proportion of mountains favorable for phototopographic surveying than the United States proper. Includes also a discussion, based largely on French treatises, of the use of the camera in aerial surveys. The illustrations consist of maps showing positions of camera stations, photographs taken with the panoramic camera, and diagrams showing features of the instruments and details of the computations required in using them.

BULLETIN 660–A. Notes on the geology and iron ores of the Cuyuna district, Minn., by E. C. Harder and A. W. Johnston. 1917. Pp. 1–26, Pl. I.

Part of Bulletin 660, Contributions to economic geology, 1917, Part I. A brief preliminary report of the results so far obtained in a geologic examination of the Cuyuna iron district, in connection with which a study has also been made of the rock outcrops in east-central Minnesota, immediately west, south, and east of the district. Contains a map of east-central Minnesota showing the location of the Cuyuna district and a part of the Mesabi district.

BULLETIN 661–A. The Cleveland gas field, Cuyahoga County Ohio, with a study of rock pressure, by G. S. Rogers. 1917. Pp. 1–99, Pls. I–II, figs. 1–13.

Part of Bulletin 661, Contributions to economic geology, 1917, Part II. Describes briefly the stratigraphy, structure, and gas resources of the Cleveland field, which is of special interest on account of its immediate proximity to a great manufacturing city that has long been a consumer of large quantities of natural gas. Discusses the life and decline of gas wells

in general and particularly of those in this field, which, unfortunately, is a conspicuous example of wasteful development. Contains a map showing the geologic structure of the Cleveland gas field and diagrams and curves representing the decline in rock pressure and the accompanying decrease in production in numerous wells in this field.

Parts of Bulletin 666, Our mineral supplies. This bulletin will be made up of short summaries of the mineral supplies of the United States that are useful in time of war. The following chapters have already been issued:

Bulletin 666–A. Chromite, by J. S. Diller. 1917. 5 pages.

Bulletin 666–B. Sulphur, by P. S. Smith. 1917. 4 pages.

Bulletin 666–C. Manganese, by D. F. Hewett. 1917. 12 pages, 2 text figures.

Bulletin 666–D. Platinum, by J. M. Hill. 1917. 4 pages.

Bulletin 666–E. Gypsum, by R. W. Stone. 1917. 3 pages.

Bulletin 666–F. Salt, bromine, and calcium chloride, by R. W. Stone. 1917. 4 pages.

Bulletin 666–G. Sand and gravel, by R. W. Stone. 1917. 3 pages.

Bulletin 666–H. Asbestos, by J. S. Diller. 1917. 4 pages.

Bulletin 666–I. Talc and soapstone, by J. S. Diller. 1917. 2 pages.

Bulletin 666–J. Phosphate rock, by R. W. Stone. 1917. 4 pages.

Bulletin 666–K. Grinding and polishing materials, by F. J. Katz. 1917. 3 pages.

Bulletin 666–L. Graphite, by H. G. Ferguson. 1917. 7 pages.

Bulletin 666–M. Coal, by C. E. Lesher. 1917. 7 pages.

Bulletin 666–N. Potash, by H. S. Gale. 1917. 4 pages.

Bulletin 666–O. Bauxite and aluminum, by J. M. Hill. 1917. 4 pages.

Bulletin 666–P. Alaska's mineral supplies, by A. H. Brooks. 1917. 14 pages.

Bulletin 666–T. Clay and clay products, by Jefferson Middleton. 1917. 3 pages.

Bulletin 666–W. Barium and strontium, by J. M. Hill. 1917. 3 pages.

Water-Supply Paper 360. Surface water supply of the United States, 1913, Part X, The Great Basin; N. C. Grover, chief hydraulic engineer; E. A. Porter, H. D. McGlashan, F. F. Henshaw, and G. C. Baldwin, district engineers. 1916. 293 pages, 2 plates, 1 text figure.

Water-Supply Paper 361. Surface water supply of the United States, 1913, Part XI, Pacific slope basins in California; N. C. Grover, chief hydraulic engineer; H. D. McGlashan and F. F. Henshaw, district engineers. 1916. 514 pages, 2 plates, 1 text figure.

Water-Supply Paper 362. Surface water supply of the United States, 1913, Part XII, North Pacific drainage basins; N. C. Grover, chief hydraulic engineer; G. L. Parker, W. A. Lamb, G. C. Baldwin, and F. F. Henshaw, district engineers. 1916. 764 pages, 2 plates. (Issued first in three separate chapters bearing the following titles: A, Pacific basins in Washington and Upper Columbia River basin; B, Snake River basin; C, Lower Columbia River and Rogue, Umpqua, and Siletz rivers.)

These reports present briefly the results of measurements of stream flow made in the drainage basins named during the calendar year 1913. Data for each gaging station are given under the following headings: Location, Records available, Drainage area, Gage, Channel, Discharge measurements, Winter flow, Diversions, Accuracy, and Cooperation. The books contain also tables giving gage heights and daily and monthly discharges at each station, and halftone plates representing typical gaging stations, current meters, and automatic water-stage recorders.

WATER-SUPPLY PAPER 380. The Navajo country, a geographic and hydrographic reconnaissance of parts of Arizona, New Mexico, and Utah, by H. E. Gregory. 1916. 219 pages, 29 plates, 29 text figures.

Gives a brief account of the history and exploration of the Navajo country, a description of its geographic features, and a detailed discussion of its water resources. The Navajo country includes six Indian reservations, comprising more than 22,000 square miles—the largest area of undeveloped Indian land in the United States. As the future of this region depends fundamentally on its water supply, the author, in his investigations, devoted his efforts primarily to the solution of this problem. The illustrations include topographic and geologic maps of the Navajo country, numerous halftone plates depicting interesting features of its geography and geology, sections of many of the wells in the region, and diagrams showing distribution of ground water and rainfall and methods of constructing wells and water catches.

WATER-SUPPLY PAPER 381. Surface water supply of the United States, 1914. Part I, North American slope drainage basins; N. C. Grover, chief hydraulic engineer; C. C. Covert, C. H. Pierce, and G. C. Stevens, district engineers. 1916. 195+xxxvii pages, 2 plates.

WATER-SUPPLY PAPER 382. Surface water supply of the United States, 1914. Part II, South Atlantic and eastern Gulf of Mexico basins; N. C. Grover, chief hydraulic engineer; G. C. Stevens and W. E. Hall, district engineers. 1916. 66+xxx pages, 2 plates.

WATER-SUPPLY PAPER 384. Surface water supply of the United States, 1914. Part IV, St. Lawrence River basin, prepared under the direction of N. C. Grover, chief hydraulic engineer, by W. G. Hoyt, A. H. Horton, C. C. Covert, and C. H. Pierce. 1916. 128+xxix pages, 2 plates.

WATER-SUPPLY PAPER 386. Surface water supply of the United States, 1914. Part VI, Missouri River basin; N. C. Grover, chief hydraulic engineer; W. A. Lamb and Robert Follansbee, district engineers. 1917. 220+xli pages, 3 plates.

WATER-SUPPLY PAPER 387. Surface water supply of the United States, 1914. Part VII, Lower Mississippi River basin; N. C. Grover, chief hydraulic engineer; Robert Follansbee and G. A. Gray, district engineers. 1916. 60+xxxiv pages, 2 plates.

WATER-SUPPLY PAPER 391. Surface water supply of the United States, 1914, Part XI, Pacific slope basins in California; N. C. Grover, chief hydraulic engineer; H. D. McGlashan and F. F. Henshaw, district engineers. 1917. 334+xxxvi pages, 2 plates.

WATER-SUPPLY PAPER 392. Surface water supply of the United States, 1914, Part XII, North Pacific drainage basins, A: Pacific drainage basins in Washington and upper Columbia River basin; N. C. Grover, chief hydraulic engineer; G. L. Parker and W. A. Lamb, district engineers. 1916. 200 pages, 2 plates.

WATER-SUPPLY PAPER 393. Surface water supply of the United States, 1914, Part XII, North Pacific drainage basins, B: Snake River basin; N. C. Grover, chief hydraulic engineer; G. C. Baldwin and F. F. Henshaw, district engineers. 1916. 248 pages, 2 plates.

WATER-SUPPLY PAPER 394. Surface water supply of the United States, 1914, Part XII, North Pacific drainage basins, C: Lower Columbia River and Pacific drainage basins in Oregon; N. C. Grover, chief hydraulic engineer; F. F. Henshaw and G. L. Parker, district engineers. 1917. 180+xlix pages, 2 plates.

These papers present briefly the results of measurements of stream flow in the basins named in the titles during the calendar year 1914. Data for each gaging station are given under the following heads: Location, Records available, Drainage area, Gage, Channel, Discharge measurements, Extremes of discharge, Diversions, Accuracy, and Cooperation. The books contain also tables giving gage heights and daily and monthly discharges at each station and halftone plates representing typical gaging stations, current meters, and automatic water-stage recorders. At the end of each book (except Nos. 392 and 393, which must be combined with No. 394 to make the complete report for the year on the north Pacific basins) is a list of all gaging stations maintained in the drainage basins covered and an annotated list of publications issued by the United States Geological Survey relating specifically to the region, as well as a similar list of reports that are of general interest, covering a wide range of hydrologic subjects, and brief references to reports published by State and other organizations.

WATER-SUPPLY PAPER 395. Colorado River and its utilization, by E. C. La Rue. 1916. 231 pages, 25 plates, 5 text figures.

This paper assembles the principal facts relating to the water resources of Colorado River, on the proper control of which depends the productivity and prosperity of an area extending over parts of seven States. The author has studied especially the possibility of controlling the flow of the whole river by means of storage reservoirs, so as to avoid a recurrence of the disastrous effects on Imperial Valley caused a few years ago by the diversion of the whole flow of the river instead of merely a part to the Salton Sink. Proper control would also render available for profitable use an enormous quantity of water which now flows unused and almost unusable to the Gulf of California in the form of floods.

The illustrations consist of maps showing irrigable land in parts of the Colorado River basin and diversions from this basin to that of Mississippi River and to the Great Basin, charts showing daily and annual discharge and gage heights of Colorado River, and photographic reproductions of scenes along the river.

WATER-SUPPLY PAPER 396. Profile surveys in the Colorado River basin in Wyoming, Utah, Colorado, and New Mexico, prepared under the direction of W. H. Herron, acting chief hydrographer. 1917. 6 pages, 43 plates.

Consists chiefly of maps showing outlines of river banks, islands, position of rapids, falls, and shoals, and existing dams in the Colorado River basin. The streams to which the surveys relate are fully described in Water-Supply Paper 395.

Parts of Water-Supply Paper 400, Contributions to the hydrology of the United States, 1916, as follows:

WATER-SUPPLY PAPER 400–B. Artesian water for irrigation in Little Bitterroot Valley, Mont., by O. E. Meinzer. 1916. Pp. 9–37, Pls. I–IV, figs. 1–4.

Discusses the water resources of the semiarid Little Bitterroot Valley, in northwestern Montana, which was opened to white settlers in 1910. Little Bitterroot River, which traverses the valley, does not furnish enough water to irrigate the farms, and the rainfall is also inadequate. The author recommends the use for irrigation of artesian water, the supply of which is very plentiful in the valley now, and he advocates project ownership rather than private, so that there may be no waste.

WATER-SUPPLY PAPER 400–C. The measurement of silt-laden streams, by R. C. Pierce. 1916. Pp. 39–51, figs. 5–6.

Gives the results of discharge measurements of San Juan River made near Bluff, Utah, during the summer of 1915, together with diagrams show-

ing the rating, area, and velocity curves of the stream flow. The paper should be of interest to hydraulic engineers who may have occasion to measure streams carrying heavy loads of silt.

WATER-SUPPLY PAPER 400–D. Accuracy of stream-flow data, by N. C. Grover and J. C. Hoyt. 1916. Pp. 53–59.

A discussion of the conditions affecting accuracy of records of daily discharge and of the degree of accuracy required in such records for their three principal uses—in predicting flow, in the immediate operation of hydraulic works, and in studying past flow.

WATER-SUPPLY PAPER 400–E. Ground water for irrigation in the Morgan Hill area, Cal., by W. O. Clark. 1917. Pp. 61–108, Pls. V–VII, figs. 7–11.

Describes briefly the geology and drainage of the Morgan Hill area, Cal., a part of Santa Clara Valley about 20 miles from the city of San Jose, with especial reference to its ground-water supply and the best means of utilizing it. Contains maps of the area showing positions and fluctuations of the water table at different stages, logs of wells, and tables giving water levels in many of the wells.

WATER-SUPPLY PAPER 402. Surface water supply of the United States, 1915. Part II, South Atlantic and eastern Gulf of Mexico basins; N. C. Grover, chief hydraulic engineer; G. C. Stevens and W. E. Hall, district engineers. 1916. 51 + xxx pages, 2 plates.

WATER-SUPPLY PAPER 405. Surface water supply of the United States. 1915. Part V, Hudson Bay and Upper Mississippi River basins; N. C. Grover, chief hydraulic engineer; W. G. Hoyt and A. H. Horton, district engineers. 1917. 215 + xxx pages, 4 plates.

WATER-SUPPLY PAPER 407. Surface water supply of the United States, 1915, Part VII, Lower Mississippi River basin; N. C. Grover, chief hydraulic engineer; Robert Follansbee and G. A. Gray, district engineers. 1917. 43 + xxxiii pages, 2 plates.

These reports present briefly the results of measurements of stream flow made in the drainage basins named during the calendar year 1915. They are similar to the reports for 1914 noticed on pages 27–28.

WATER-SUPPLY PAPER 415. Surface waters of Massachusetts, by C. H. Pierce and H. J. Dean, 1916. 433 pages, 12 plates, 6 text figures.

A compilation of available data on the flow of Massachusetts streams, including the classic records collected on the Merrimack at Lowell and Lawrence, on the Connecticut at Holyoke, and on the Cochituate and Sudbury by the Metropolitan Water and Sewerage Board, as well as records covering shorter periods, all of which have been studied in the light of the best obtainable information and revised where necessary and possible. Contains also a gazetteer of streams, lakes, and ponds in Massachusetts and illustrations, consisting of a map of the State showing the principal drainage basins and location of gaging stations, a profile of Deerfield River, curves showing the water-stage record of several of the streams, and views of dams and other devices employed to utilize their water power.

WATER-SUPPLY PAPER 416. The divining rod, a history of water witching, with a bibliography, by A. J. Ellis. 1917. 59 pages, 4 text figures.

This paper was published as a reply to the numerous inquiries that are continually received by the Survey from all parts of the country as to the efficacy of the divining rod in locating underground water. The use of a forked twig, or so-called divining rod, in locating minerals is a curious superstition that has been a subject of discussion since the middle of the sixteenth century and still has a strong hold in the popular mind. Needless to

say, the Survey advises all inquirers not to expend money for the services of a "water witch" or for the use or purchase of any machine or instrument devised for locating underground water or other minerals.

WATER-SUPPLY PAPER 417. Profile surveys of rivers in Wisconsin, prepared under the direction of W. H. Herron, acting chief geographer. 1917. 16 pages, 32 plates.

WATER-SUPPLY PAPER 419. Profile surveys in 1915 in Skagit River basin, Wash., prepared under the direction of W. H. Herron, acting chief geographer. 1916. 8 pages, 12 plates.

WATER-SUPPLY PAPER 420. Profile surveys along Henrys Fork, Idaho, and Logan River and Blacksmith Fork, Utah, prepared under the direction of W. H. Herron, acting chief geographer. 1916. 8 pages, 10 plates.

WATER-SUPPLY PAPER 421. Profile surveys in 1915 along the Rio Grande, Pecos River, and Mora River, N. Mex., prepared under the direction of W. H. Herron, acting chief geographer. 1916. 11 pages, 11 plates.

These papers describe briefly the general features of the river basins named in their titles, and give a list of the gaging stations maintained by the Geological Survey in those basins. They contain also numerous plans and profiles of the rivers, showing in outline their banks, islands, rapids, falls, shoals, dams, and crossings of ferries and roads.

WATER-SUPPLY PAPER 423. Geology and water resources of Big Smoky, Clayton, and Alkali Spring valleys, Nev., by O. E. Meinzer. 1917. 167 pages, 15 plates, 11 text figures.

Describes the physiography and geology of three typical desert valleys in Nevada, none of which has a drainage outlet, and discusses in detail their underground-water supply and its quality. Big Smoky Valley is very much larger and more thickly settled than the other two valleys, and the author concludes that although its ground-water supply is plentiful, full utilization of that supply for irrigation is possible only by pumping and that extensive development will not be economically practicable until cheaper power or more valuable crops can be introduced than are now in sight. The illustrations include a map of each valley described, profiles across beaches in Big Smoky Valley, diagrams showing average monthly precipitation and fluctuations of the water-level in one of the wells, and halftone plates depicting geologic conditions in the region brought about by the action of water.

WATER-SUPPLY PAPER 425–A. Ground water in San Simon Valley, Arizona and New Mexico, by A. T. Schwennesen, with a section on agriculture, by R. H. Forbes. 1917. Pp. 1–35. Pls. I–III, figs. 1–2.

Discusses the water resources and agricultural possibilities of San Simon Valley, in southeastern Arizona. Although a few white settlers have been in the valley since the early seventies, its agricultural development did not begin until 1910, when artesian water was discovered at San Simon. The paper is illustrated by maps of the San Simon basin and certain portions of it showing locations of deep wells, flowing-well areas, and depths to ground-water table.

MINERAL RESOURCES OF THE UNITED STATES, 1915. Remainder of advance chapters (thirteen issued in fiscal year 1916). Volume not yet published June 30, 1917.

MINERAL RESOURCES OF THE UNITED STATES, 1916. Two advance chapters, as follows:

Fuel briquetting in 1916, by C. E. Lesher. 1917. Pp. 1–4, fig. 1.

Sand-lime brick in 1916, by Jefferson Middleton. 1917. Pp. 5–6.

GEOLOGIC FOLIO 201. (Octavo edition; folio edition issued in fiscal year 1916.) Minneapolis-St. Paul folio, by F. W. Sardeson. 1916. 100 pages+list of published geologic folios, 8 maps, 22 plates, 14 text figures.

Description and maps of the Anoka, Minneapolis, St. Paul, and White Bear quadrangles, comprising about 846 square miles in Anoka, Dakota, Hennepin, Ramsey, Scott, and Washington counties, Minn.

GEOLOGIC FOLIO 202. Eureka Springs-Harrison folio, Arkansas-Missouri, by A. H. Purdue and H. D. Miser. 1916. 21 folio pages of text, 4 maps, 1 structure-section sheet, 1 columnar-section sheet, 9 plates, 13 text figures.

Description and maps of the Eureka Springs and Harrison quadrangles, comprising about 1,925 square miles in Benton, Boone, Carroll, Madison, Newton, and Washington counties, Ark., and Barry, Stone and Taney counties, Mo.

GEOLOGIC FOLIO 203. Colorado Springs folio, Colorado, by G. I. Finlay. 1916. 15 folio pages of text, 4 maps, 1 structure-section sheet, 1 columnar-section sheet, 1 correlation sheet, 14 plates, 9 text figures.

Description and maps of the Colorado Springs and Manitou quadrangles, comprising about 995 square miles in Fremont, El Paso, Pueblo, and Teller counties, Colo.

GEOLOGIC FOLIO 204. Tolchester folio, Maryland, by B. L. Miller, E. B. Mathews, A. B. Bibbins, and H. P. Little. 1917. 14 folio pages of text, 2 maps, 1 columnar-section sheet, 10 plates, 3 text figures.

Description and maps of the Tolchester quadrangle, comprising about 925 square miles in Anne Arundel, Baltimore, Cecil, Harford, Kent, and Queen Annes counties, Md.

GEOLOGIC FOLIO 205. Detroit folio, Michigan, by W. H. Sherzer. 1917. 22 folio pages of text, 12 maps, 12 plates, 20 text figures.

Description and maps of the Wayne, Detroit, Grosse Pointe, Romulus, and Wyandotte quadrangles, comprising about 770 square miles in Macomb, Monroe, Oakland, and Wayne counties, Mich. Published also in octavo form, 162 pages.

GEOLOGIC FOLIO 206. Leavenworth-Smithville folio, Missouri-Kansas, by Henry Hinds and F. C. Greene. 1917. 13 folio pages of text, 4 maps, 10 plates, 10 text figures.

Description and maps of the Leavenworth and Smithville quadrangles, comprising about 460 square miles in Leavenworth and Atchison counties, Kans., and Platte, Clay, and Clinton counties, Mo.

Topographic and other maps as follows:

Arkansas (State).[1]
Batavia, Ohio.
Berryville, W. Va.[2]
Birds, Ill.-Ind.
Bristol Range, Nev.
Bristow, Okla.
Canaseraga, Okla.
Capon Bridge, W. Va.-Va.[2]
Castlegate, Utah.
Ceres, Cal.
Chehalis, Wash.
Cholame, Cal.[3]
Claremore, Okla.[4]
Condon, Oreg.
Copperopolis, Cal.
Coyote Rapids, Wash.
Creede, Colo.
Cressey, Cal.
Crows Landing, Cal.
Delevan, Cal.
Denair, Cal.
Diamond Lake, Oreg.
Elizabeth Lake, Cal.
Elmira, Cal.
Equality, Ill.
Ewell, Va.-Md.
Florida (State).[5]
Fords Ferry, Ky.-Ill.[6]
Gerrardstown, W Va.-Va.[6]
Gila Butte, Ariz.
Golconda, Ky.-Ill.[6]
Greenfield, Ohio.
Heathsville, Va.-Md.
Henderson, Ky.-Ind.
Henry, Idaho.
Hopeton, Cal.
Humboldt, Nebr.
Hurley, Va.-Ky.
Indiana (State).[1]

[1] Photolithograph, 1 : 1,000,000.
[2] Office edition only, showing part of quadrangle.
[3] Sheet completed; part engraved in 1914.
[4] Resurvey.
[5] Photolithograph, 1 : 500,000.
[6] Preliminary edition, showing part of quadrangle.

Inez, Ky.
Interlachen, Fla.
Iowa (State).[1]
Jacinto, Cal.
Jacobs Corner, Cal.
Kiefer, Okla.
Kilmarnock, Va.
Kimmswick, Mo.-Ill.[2]
Kurand, Cal.[3]
Liberty, Maine.
Logan, Utah-Idaho.
Logandale, Cal.
Lyman, Cal.
Malone, N. Y.
Mathews, Va.
Mechanicsburg, Ohio.
Merced, Cal.
Milford Center, Ohio.
Minnesota (State).[1]
Mississippi (State).[1]
Missouri (State).[1]
Mitchell School, Cal.
Morrow, Ohio.
Muscle Shoals, Ala.
Nashua, Mont.
Octa, Ohio.
Pikeville, Ky.
Plattsburg training camp, N. Y.
Point of Sands, N. Mex.
Portland and vicinity, Maine.
Portneuf, Idaho.
Pounding Mill, Va.-W. Va.[3]
Priest Rapids, Wash.
Richlands, Va.[3]
Riverbank, Cal.
Rogersville, Ala.
Sabina, Ohio.
St. Charles, Mich.
San Juan Bautista, Cal.
Santa Rosa, Cal.
Sturgeon, Mo.
Talking Rock, Ga.
Three River, Mich.-Ind.
Tomah, Wis.
Tularosa, N. Mex.
Turlock, Cal.
Urbanna, Va.
Vernal, Utah.
Washington and vicinity, D. C.-Md.-Va.
Washington (national capital).
Waterford, Cal.
White Mountain, Cal.-Nev.
Willamette Valley, Oreg., sheet 7.[4]
Willamette Valley, Oreg., sheet 8.[4]
Wind Gap, Pa.
Xenia, Ohio.

[1] Photolithograph, 1 : 1,000,000.
[2] Sheet completed; part engraved in 1913.
[3] Preliminary edition, showing part of quadrangle.
[4] Photolithograph in colors.

GEOLOGIC BRANCH.

SCOPE OF WORK.

The Survey was established for "the classification of the public lands and the examination of the geological structure, mineral resources, and products of the national domain" and was later authorized "to continue the preparation of a geological map of the United States." The operations of the geologic branch extend to every region of the country and to nearly every field of geology. It has taken the lead both in scientific geologic research and in assisting the development of the mineral resources of the country, as well as taking a part in both popular and technical geologic education. As a national bureau of public information on geologic matters, relating to not only all parts of the United States and Alaska but to other countries as well, the Survey's activities are shown by the range of its correspondence, which is constantly increasing.

ORGANIZATION.

The geologic branch is organized in four divisions—geology, David White, chief geologist, in charge; Alaskan mineral resources, Alfred H. Brooks, geologist, in charge; mineral resources, H. D. McCaskey, geologist, in charge; and chemical and physical researches, G. F. Becker, geologist, in charge.

The geologic investigations to be carried on by the Survey in the United States are planned by the chiefs of sections in the division of geology in council with the chief geologist. The chief geologist also gives particular attention to cooperation with State surveys and devotes such time as is available to him for field work to field inspections and conferences with chiefs of sections and geologists and to the direction and inspection of the work of the section of oil and gas investigations.

LEGEND

Geologic folios

Detailed maps

Reconnaissance maps

Exploratory maps

MAP OF THE UNITED STATES SHOWING AREAS COVERED BY GEOLOGIC MAPS PUBLISHED PRIOR TO JULY 1, 1917

Scale 1:6,000,000

100 0 100 200 300 400 500 Miles

PUBLICATIONS.

The publications of the fiscal year 1917 prepared wholly or partly in the geologic branch embrace 36 professional papers, bulletins, etc., 105 chapters of reports later published as annual volumes, and 5 geologic folios. Titles and brief abstracts of these publications are given on pages 14–31. Besides the official publications, 44 papers were, with the permission of the Director, published by scientific societies or elsewhere in scientific and technical journals. Seven reports based on work done in cooperation with State geological surveys have, in accordance with the cooperative agreements, been transmitted to the States for publication. One extensive report, prepared in cooperation with the Carnegie Institution, the Bureau of Fisheries, and the Panama Canal Commission, has been submitted to the National Museum for publication. In the preparation of the reports of mineral production considerable material relating to certain of the industries in the different States is compiled by the State geologists.

PROGRESS OF GEOLOGIC MAPPING.

The areas in the United States covered by geologic maps published by the Survey and the general nature of the work in each area are shown on Plate I. This map does not, however, indicate areas for which reports, prepared by this Survey, have been submitted for publication to cooperating State organizations or to other bureaus and departments of the Federal Government.

The progress of geologic surveying in Alaska is described in the section on the devision of Alaska mineral resources (pp. 81–91).

DIVISION OF GEOLOGY.

ORGANIZATION AND PERSONNEL.

The scientific force of the division of geology at the beginning of the year consisted of 72 geologists, 29 associate geologists, 31 assistant geologists, 7 junior geologists, and 17 geologic aids. During the year 14 members of the scientific staff resigned to take positions in private life at higher salaries; 3 members died; 2 were transferred to another bureau; 1 was transferred to the land-classification board; 12 were dropped from the rolls; 9 new members were appointed; and 1 was transferred from another division. The total number of geologists of various grades on the divisional staff at the end of the year was 134, there having been a net loss of 22.

For most of the year the division of geology included 10 sections, the scope of whose work was outlined in the last report. In April, on account of the increasing importance of the metals used in steel making and the special attention required for the alloy metals on

account of war conditions, a redistribution of the work among 11 sections was made, as stated on pages 43–46.

The geologic work of the division, both in the field and in the office, is under the immediate supervision of the chiefs of the respective sections, who are directly responsible for efficiency in operation and the scientific standard of results. Exceptions have been made of the studies of the structure in the Great Basin region by G. K. Gilbert and of the petrologic, structural, and historical researches in the San Juan region of Colorado by Whitman Cross. The work of these distinguished senior geologists of the Survey is reported directly to the chief geologist. The general monographic treatment of the geology of the Yellowstone National Park, long in preparation by Arnold Hague, was nearly completed at the time of his death early in May.

R. V. L. Stratton, of the geologic branch, received a commission as lieutenant (assistant paymaster) in the United States Navy prior to June 30, 1917.

ALLOTMENTS.

The total funds available for the geologic work of the Survey in the United States for the year 1916–17 were as follows:

Geologic surveys	$350,000
Statutory salaries	13,700
Search for potash deposits (part of the appropriation for chemical and physical researches)	16,700
	380,400

These funds were allotted as follows:

Section of eastern areal geology	$18,700
Section of western areal geology	29,820
Section of Coastal Plain investigations	14,810
Section of stratigraphy and paleontology	18,120
Section of metalliferous deposits	54,600
Section of nonmetalliferous deposits (including potash)	38,820
Section of glacial geology	6,150
Section of eastern coals	7,040
Section of western coals	18,510
Section of iron and steel alloys[1]	600
Section of oil and gas	52,380
Geologic map editing	7,020
Great Basin investigation and inspection	3,600
Supervision, administration, salaries of clerical, technical, and skilled labor forces, instruments, supplies, and contingent fund	80,510
	350,680
Land-classification board	29,720
	380,400

[1] The work of this section during the spring was mainly carried in the allotments of other sections.

Of the amounts allotted to this division $272,500 was expended directly for field work, including the search for potash. Of this amount $180,800, or 66.3 per cent, was expended west of the one hundredth meridian and $91,700, or 33.7 per cent, east of the one hundredth meridian. With the $29,720 for the operations of the land classification board, 69.6 per cent of the total, exclusive of the allotment for supervision, etc., was spent for investigations west of the one hundredth meridian—that is, essentially in the public land States. The expenditures for supervision, etc., are divisible in about the same proportion between the eastern and western work.

COOPERATION WITH FEDERAL BUREAUS AND STATE SURVEYS.

In strictly geologic field investigations or paleontologic studies the Survey cooperated, through the division of geology, with 25 States—Alabama, Connecticut, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Jersey, North Carolina, North Dakota, Oklahoma, Ohio, Pennsylvania, Tennessee, Texas, Vermont, Virginia, Washington, and Wisconsin. Informal cooperation exists between the Survey and all the States having geological surveys.

Foremost in the service rendered by the geologic branch of the Survey to other departments are the reports on the drainage and underground water supplies of the Gulf and Atlantic Coastal Plain and the information furnished as to camp locations, foundations, building materials, etc. The Survey cooperated with the Bureau of Mines in the metallographic study of ores and the investigation of the invasion of California oil wells by salt water, and with the Bureau of Mines, the Bureau of Standards, and the Office of the Supervising Architect in the grading of the Indiana limestones. A technologic paper prepared by a Survey geologist in the course of his detailed investigations of mineral deposits has been submitted for publication to the Bureau of Mines, which in turn has transmitted to the Survey a geologic report to be published as a bulletin. The Survey is also engaged with the Bureau of Standards, the Bureau of Mines, and the Office of Public Roads and Rural Engineering in a thorough and systematic study of the building stones of the United States. Field examinations of oil, gas, and nitrate deposits have been made for the War and Navy departments. Through the division of geology it cooperated informally with the Smithsonian Institution, the Bureau of Fisheries, the Coast and Geodetic Survey, the Forest Service, the Weather Bureau, the Lighthouse Service, and the Office of Indian Affairs, as well as with a number of institutions

of learning, including in particular the Geophysical Laboratory and the Marine Biological Station of the Carnegie Institution. Services have been rendered to the Department of Justice in connection with its suits regarding public lands; to the Bureau of Foreign and Domestic Commerce in reporting the production of certain raw materials; and, most important of all, to the General Land Office in the classification of withdrawn coal, oil, and phosphate lands.

GENERAL FEATURES OF THE WORK OF THE YEAR.

All phases of geologic work have been continued, though for lack of funds it has been necessary to refuse requests for field examinations in greater number than ever before. During the later part of the year, especially after the declaration of war, not only were such requests much more numerous but the offers to the Government of mineral deposits of many kinds and in many regions necessitated special examination of all available data.

The dominant feature of the work of this division during the year has been the greater concentration of effort along economic lines, particularly in the location and development of mineral deposits of special importance to the successful prosecution of the war and the continued maintenance of the industrial strength of the Nation.

In recognition of the probable deficiency of the domestic petroleum supply to meet the demands to be made upon it for war purposes, this vital question was among the first to receive attention. Careful estimates of the country's oil resources, based on the most complete and trustworthy criteria available, were made by the oil and gas geologists most familiar with the different fields and provinces. The general results of these estimates, summarized by fields and integrated as to oil contents of the public lands, naval reserves, etc., have been published. At the same time the progress of exploration by the drill has been carefully followed, and every effort has been made to extend assistance. The search for areas in which the geologic conditions, including the structure, would appear to be favorable for the occurrence of undiscovered oil pools was pushed as vigorously as was possible with the available resources in funds and trained oil and gas geologists. Mention of this work will be found in the accounts of the geologic investigations in the different States. During the year ten reports pointing out areas favorable for testing in different State have been printed; nine similar reports are in process of publication, and fifteen others are in process of criticism or ready for transmission. For some areas, in order to bring more quickly the particular results of the geologic explorations to the attention of the public, short advance statements have been distributed to the press.

In the administration of Indian lands by the Office of Indian Affairs there has been active cooperation on the part of the Geological Survey. This has been accomplished by the geologic examination of these lands prior to their leasing. The prompt publication of the results obtained by the geologist has proved an incentive to the leasing of the particular areas on which reports are made, a guide to the valuation of the leases, and a help in concentrating drilling where conditions are most favorable for large production.

The investigation of the so-called hydrocarbons or oil-shale deposits of the country, begun four years ago by the Survey, has been diligently prosecuted. The extension of the oil shales of the Uinta Basin westward toward Green River in Utah has been mapped, with the discovery of new areas, so that it is now estimated that there is enough of this shale, in beds 3 feet or more in thickness and capable of yielding more than 22 gallons of oil to the ton by distillation, to provide as much as 40,000,000,000 barrels of petroleum. The Uinta Basin contains a vast storehouse of petroleum in this form, the volume of which is better realized when it is recalled that all the oil that has yet been produced in the United States is but about 3,500,000,000 barrels. The oil fields of the United States are now producing a little over 300,000,000 barrels of petroleum a year, which is about two-thirds of all that is yearly taken from the ground the world over. What new oil pools and fields may yet be discovered in other parts of the world, particularly the less explored regions, no one can foretell, but it seems probable not only that oil will be distilled from the shales of the Green River group long after the principal oil fields of the world have been exhausted but also that the total amount that will be obtained from this source may exceed the world's total production of natural petroleum. The standard of richness named in the above estimate is said to be up to the average of the Scotch shale, which has for many years been the basis of a large industry and which is now providing distillate for British naval and military uses.

A report showing the distribution of the oil shales in Colorado and northeastern Utah and giving analyses and the results of rough tests and laboratory experimental distillations, nitrogen determinations, etc., has been issued as Bulletin 641–F, and another report describing the westward extension of the deposits, with additional details as to the composition of the shales, is now ready for publication. A report giving the results of distillation tests of richly bituminous shales in several of the Eastern States has been issued as Bulletin 641–L.

The investigation of the oil shales has been typically a preparedness measure. How soon it will be necessary to draw rapidly from this source remains to be seen, but it is worthy of note that a small commercial plant is already about to begin the treatment of the oil shales near De Beque, Colo., and that several other plants are projected or in process of construction. Undoubtedly the shales will be found somewhat richer under thick cover than where they have been sampled at the outcrop. It is gratifying also to observe that several State surveys are giving attention to the subject of recovering oil from such bituminous shales and of investigating their possible importance as a source of new as well as of already known by-products.

A new map showing the oil and gas fields of the United States and the trunk pipe lines, together with the oil-exporting points, has been prepared under the supervision of J. D. Northrop and is now in process of engraving.

Another branch of war-preparedness work to which precedence has been given in this division during the year is the systematic investigation of reported or little known deposits of minerals which are especially important to the conduct of the war but for which the country is largely dependent on importations, the attention of the public being called to such of these as may with commercial success be made to contribute to the Nation's supply. Among the more important of these minerals are potash, nitrates, manganese, pyrite, tungsten, chromite, tin, antimony, and molybdenum.

The search for commercial sources of potash and nitrates has continued with unabated zeal. As the stocks of imported potash salts have diminished almost to exhaustion and prices for these materials have increased tenfold and even more, the demand for assurance of a certain supply has become more urgent. Fortunately the most indispensable requirements have been met, although with a production in 1916 of less than 5 per cent of the normal consumption before the war, there is still much room for improvement. During the first half of 1917 the rate of production was more than twice that for 1916 and continued improvement is expected.

The greater part of the potash so produced has been derived from mineral sources, although considerable has been obtained from organic materials, such as molasses residue from distilleries and kelp and wood ashes. The most promising source of potash is the saline deposit at Searles Lake, Cal. The first published announcement of this as a potentially valuable deposit of potash was made by the United States Geological Survey in March, 1912, and it is naturally a source of some satisfaction to see this prediction fulfilled, especially as it was regarded as the opposite of scientifically conservative opinion at the time of publication. Considerable potassium sulphate has

also been recovered from the alunite of Marysvale, Utah. This deposit also was the subject of special study by the United States Geological Survey and was covered in its early publications on the prospective sources of potash. The Nebraska alkali lakes have made a surprising record of production. Although not of large extent or seeming to offer a great reserve of raw material, the exceptionally high content of potash in some of these waters made this product one of the most readily available sources for a commercial output. This source also was early reviewed in the Survey potash publications, but though the facts of its potash content were carefully stated, the occurrence was not then given the prominence that some of the other apparently more extensive resources received. For a time the Nebraska lakes held the lead as a source of commercial potash, and they still yield a very important production.

Besides those projects that have reached more successful development, many enterprises and prospects have been inspected, most of which have been absolutely disappointing. However, the principal efforts of the Government geologists have been directed to the study of raw materials which might become available as a basis of potash manufacture, although naturally this has involved more or less the consideration of processes by which this material could be utilized.

During 1916–17 nearly all the special fund allotted to the potash investigations was devoted to the exploration of buried saline deposits by drilling. The drilling of the well at Cliffside, in Potter County, Tex., was resumed as soon as it was possible to obtain delivery of the necessary equipment and to reorganize the crew after the allotment of funds for the year became available. At the end of June, 1917, this well had reached a depth of 1,657 feet, which approached the limit, 1,800 feet, set in the original plan. This limit was proposed not because it was expected that the salt beds would have been completely penetrated when that depth was reached but because it would cover the depths at which slight showings of potash salts had been reported in this region. Furthermore, it was as far as could probably be drilled with the fund that could be allotted for this purpose in a single year. The salt beds cut in this well have been very carefully tested, but as yet no valuable deposit of potash-rich material has been encountered. The test is conclusive, however, only for that portion of the section that has been explored and applies only to this one locality or district. The possibilities of finding strata of potash salts associated with the salt beds and gypsum occurring in great number and thickness in the "Red Beds" of the Southwest were discussed in the Thirty-seventh Annual Report, pages 12–14.

By courtesy of the owners borings in other areas of the salt-bearing formations in Texas and Oklahoma have also been inspected

and the cuttings tested, although, owing to the meager facilities of the Survey for work of this kind, much important boring is undoubtedly going on without adequate inspection with regard to the possibility of finding potash.

Various other lines of investigation have also been followed. A review and more adequate sampling with analysis of some of the large potash-feldspar deposits has been started, and some significant results bearing on the adequacy of the supply of this raw material for a possible future potash industry have been obtained. A report is nearly ready for publication.

The sericite deposits in Georgia and elsewhere have been examined, sampled, and tested for potash, and a review of the important greensand deposits in the Eastern States has been made to ascertain their potash contents. The results of these inquiries have been published.

The general conclusion has been reached that most of the nitrate deposits in this country are superficial and that the amount of nitrate they contain is not sufficient to make them of commercial importance. Yet investigations of all reported discoveries of nitrates have been made. In June, under the auspices of the War Department, H. S. Gale, geologist in charge of the section of nonmetalliferous deposits, made an examination of nitrate deposits in Guatemala.

A general report by E. S. Bastin, describing the graphite deposits of the country and including information as to several recently discovered and important deposits of flake graphite, has been submitted and is being prepared for publication.

The mica resources of the Eastern States are reviewed by D. B. Sterrett in a comprehensive report now ready for transmission, giving special attention to some of the more important areas.

Systematic examinations, amounting to a qualitative and quantitative census, of the known or reported deposits of platinum, pyrite, manganese, tungsten, chromite, tin, vanadium, strontium, nickel, and antimony have been in progress. Toward the end of the year cooperation in this work has been extended by State geological surveys and geologists of State defense councils.

With the cooperation of a number of State geological surveys, especially in the southern Appalachian region, special attention has been given to the problem of mining domestic pyrite of satisfactory grade sufficiently near the points of consumption and in quantities sufficiently large to take the place of a portion of the pyrite supply which has formerly been imported from Spain. Particular attention has been given also both to the sulphur deposits that may be made available and to the pyrrhotite that it will perhaps be necessary to utilize in making the large amounts of sulphuric acid needed in the manufacture of munitions and of commercial fertilizers.

The search for manganese, which is indispensable in the production of high-grade steel, has been even more comprehensive and systematic.

With the cooperation of geologists and of engineers every reported manganese deposit is in process of investigation and of qualitative and quantitative estimation, with a view to ascertaining the possible outputs of different grades of ore, this year, next year, and the year following. The more important deposits have been and are now under investigation by the geologists of the metalliferous and alloy sections of the division. Furthermore, through the cooperation of the Bureau of Mines and the War Minerals Committee, a joint committee composed of representatives of the Association of State Geologists, the geology committee of the Council of National Defense, the American Institute of Mining Engineers, the Mining and Metallurgical Society of America, the Bureau of Mines, and the Geological Survey, plans have been made to furnish the expert advisory services of some of the most eminent and well-known engineering and mining specialists of the country, who have patriotically volunteered to give practical professional advice to the miners of pyrites, tin, and manganese in certain districts where there is greatest need for such counsel as to mining and milling methods.

To render fuller service to the producer in marketing his ores and to the steel or alloy manufacturer in procuring his domestic ores, the Survey has established an efficient system of bringing them together by correspondence. To give the industry more ample data on production, while furnishing the Government with information as to the rate at which the domestic production is being built up and the rate at which imports may be discontinued, the Survey has planned the quarterly collection and compilation of reports of production of pyrites and manganese, and it is probable that this system of reporting will at an early date be placed on a monthly basis.

An investigation of the platinum deposits of the United States was undertaken early in the spring by L. M. Prindle and J. M. Hill. This work is conducted with close cooperation of the California State Mining Bureau and the State Council for Defense and is designed to cover completely the platinum deposits and possible points of origin of platinum in northern California and southwestern Oregon.

Another timely public service in which a number of the areal geologists and physiographers are engaged is the preparation of two geologic and geographic manuals covering the New England and Virginian regions. These papers, which are prepared on the recommendation of and in cooperation with the geography committee of the National Research Council, will describe the geologic features of the provinces and their origin, and though designed for general educational purposes will give special attention to the inclusion of matter of greatest value in military training and the strategy of the regions covered. Other similar manuals covering other military departments are in prospect. Plans are also being formulated for the preparation and printing of interesting and instructive popular de-

scriptions of the geologic features and their origin in the Army cantonments and surrounding areas. These popular descriptions, with accompanying military data, are to be printed on the backs of the topographic maps of areas including the vicinity of the cantonments.

The popular appreciation of the educational work of the Survey in the publication of the guides to the routes of four western railways has necessitated the issue of new editions of these bulletins. During the year the manuscript and illustrations for a similar guide to the route of the Denver & Rio Grande Railroad in Colorado and Utah has been submitted, but its publication is likely to be delayed for the issue of reports immediately connected with the successful prosecution of the war.

In general the work in economic geology has gone forward as vigorously as the available personnel and funds would permit. The metallographic studies of certain metalliferous ores and the general investigations of the geology and mineral deposits of mining districts mentioned in last year's report have made good progress. A report on the mining districts of Utah has been submitted by B. S. Butler and is now in process of editing and illustration. A revised and much extended description of the enrichment of sulphide ores, by W. H. Emmons, has been issued as Bulletin 625, and a general report on tungsten minerals and deposits, by F. L. Hess, has appeared as Bulletin 652. The report "Useful minerals of the United States," greatly amended and enlarged by F. C. Schrader and others, has been issued as Bulletin 624.

A professional paper on the geology and copper deposits of the Ray and Miami districts of Arizona, by F. L. Ransome, is nearly ready for transmission, and the general descriptions forming the main part of an exhaustive report on the Leadville district have been nearly completed by Prof. J. D. Irving. Other reports covering smaller regions are noted on later pages under the names of the several States. E. S. Larsen is preparing a report on the microscopic determination of known opaque minerals. This extensive work, the publication of which may be delayed for a time, will probably constitute a manual on the subject for the use of geologists, teachers, and students.

The introductory chapter, by M. R. Campbell, of Professional Paper 100, "The coal fields of the United States," has been issued, together with a large map showing the distribution of the coal fields of the country and the ranks of the coals. In this chapter are given short, summary descriptions of the different coal fields, with discussions of the character and qualities of the fuels, representative analyses, and estimates of the coal reserves in the various fields and of the several ranks. A second part, prepared through the courtesy of Dr. J. A. Bownocker, State geologist of Ohio, and presenting somewhat in detail the distribution, qualities, and quantities of the coals in the

coal-bearing counties of that State, is now nearly ready for issue. Parts of Professional Paper 100 describing the coal fields of a number of other States have been written, but publication of them is delayed for the preparation and publication first of papers on several other areas in the Appalachian region.

Notwithstanding some curtailment of the so-called scientific work of the division on account of economic examinations forming a part of the war work, the investigations current in the sections of areal geology, Coastal Plain investigations, and paleontology and stratigraphy have been fruitful of important results. Besides a number of minor papers noted elsewhere, mention may here in particular be made of the transmission by F. Canu, of Paris, France, and R. S. Bassler, of the National Museum, of the results of their long and searching studies on American early Tertiary Bryozoa; by F. H. Knowlton of his conclusions as to the Laramie flora of the Denver Basin, with a review of the Laramie problems; by E. W. Berry of an instructive general discussion of the middle and upper Eocene floras of southwestern America; by D. D. Condit of a description of the Paleozoic and Mesozoic stratigraphy of southwestern Montana; and by R. W. Stone and others of a report treating fully the gypsum deposits of the United States.

Progress has been made in the preparation of the report by T. N. Dale on the marbles of the Southeastern States, the work on which has been done in cooperation with the Bureau of Mines, Bureau of Standards, Office of Public Roads and Rural Engineering, and the State geological surveys of Georgia, Alabama, and Tennessee. A general description of the Tennessee marbles, prepared by Mr. Dale and C. H. Gordon, of the State Survey, has been submitted to that organization for publication.

WORK OF THE SECTIONS.

The scope of operations of the several sections of the division of geology is briefly outlined in the following synopsis:

1. The section of eastern areal geology—Arthur Keith, geologist, in charge—conducts reconnaissance and detailed work in areal or general geology in regions east of the one hundredth meridian. The work of this section is carried on in close cooperation with several State surveys and university departments of geology, an effort being made to coordinate the work of all participants. During the year the operations of the section have covered areas in Alabama, Arkansas, Illinois, Kentucky, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont, Virginia, and West Virginia.

2. The work of the section of western areal geology (west of the one hundredth meridian)—Sidney Paige, geologist, in charge—cor-

responds to that of the section of eastern areal geology and is similar in scope. The work of this section has included areal mapping and descriptions of areal geology in Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, South Dakota, Utah, Washington, and Wyoming.

3. The section of Coastal Plain investigations—T. W. Vaughan, geologist, in charge—is occupied with the study of the geology of the Atlantic and Gulf Coastal Plain of the United States in the broadest practicable way. The subjects of its investigations include physiography, stratigraphy, geologic structure, paleontology, the character and origin of the sediments, and the ground waters. During the fiscal year, especially since February, the efforts of the members of the section have been devoted mostly to compiling, digesting, and systematizing information bearing on the military preparation of this country. In cooperation with the ground-water division of the water-resources branch, the section has compiled 23 digests of the water resources of the border areas of the United States, which have been transmitted in duplicate to the Secretary of War by the Secretary of the Interior.

Investigations have been made, or reports prepared, on areas in Alabama, Arkansas, California, Delaware, Florida, Georgia, Louisiana, Maryland, Massachusetts, Mississippi, North Carolina, Rhode Island, South Carolina, Texas, Virginia, the Canal Zone, and the West Indies.

4. The section of glacial geology—W. C. Alden, geologist, in charge—is engaged in the study of the work of glaciers, the glacial and interglacial deposits and the contemporary deposits of the bordering regions, and the geologic history of the continent during the Quaternary period. The geologists occupied with those varied and specialized problems are charged with the classification and mapping of the Quaternary deposits of the glaciated regions. The work of this section during the year has comprised field studies and mapping or the preparation of reports covering areas in California, Illinois, Iowa, Massachusetts, Michigan, Minnesota, Montana, North Dakota, Oregon, Pennsylvania, Vermont, Washington, and Wisconsin.

5. The section of paleontology and stratigraphy—T. W. Stanton, geologist, in charge—deals with the classification and correlation of the sedimentary rocks of the entire country, and its work involves the study of all North American fossil faunas and floras and their comparison with those of other parts of the world. In this work it has the active cooperation of the United States National Museum in the identification and study of vertebrate fossils collected by the Survey. During the year members of the section have reported on fossils from Canada, China, Colombia, Cuba, the Galapagos Islands, Patagonia, Peru, the Dominican Republic, and Uruguay, in addition

to their usual routine work on numerous and large collections of fossils obtained in the different States and submitted by the geologic field parties. Some of the more important general studies of the year are as follows: A revised and enlarged catalogue of the Mesozoic and Cenozoic plants of North America has been almost completed. The pentremites of the Mississippian from Missouri, Illinois, Indiana, Kentucky, Tennessee, Virginia, and Alabama have been studied and classified and the Mississippian corals referred to the genus *Lithostrotion* have been described. The Silurian Ostracoda of the Appalachian region, especially those of Clinton age, have been studied with special reference to their bearing on stratigraphy.

6. The section of the geology of metalliferous deposits—F. L. Ransome, geologist, in charge—not only studies metalliferous deposits and mines and investigates the conditions and modes of ore deposition but also carries on reconnaissance and detailed geologic examinations of many new districts. The work of the section has embraced the investigation of metalliferous deposits in Arizona, California, Colorado, Idaho, Kansas, Minnesota, Missouri, Montana, Nevada, New Mexico, Oklahoma, Oregon, Tennessee, Utah, Virginia, Washington, and Wyoming.

The subsection of petrology—E. S. Larsen, jr., geologist, in charge—because of its intimate relation to the study of metalliferous deposits, is attached to this section and is charged with the critical review of the petrologic work and the determination of general petrologic material submitted. The rock-cutting laboratory is under the supervision of the chief of this subsection.

7. The section of the geology of nonmetalliferous deposits—H. S. Gale, geologist, in charge—is concerned with the study of the deposits of nonmetallic ores and minerals, exclusive of fuels, and with the geologic investigation and mapping of regions in which such minerals or deposits are of paramount importance. During the year the greater part of the work of the section has been divided between the investigation of raw materials possibly available as sources of commercial potash in various parts of the United States and special investigations relating to reported nitrate deposits; further investigation and classification of the phosphate-bearing lands in Idaho and Montana, a review of the gypsum deposits of the United States, and investigations relating to building stones have also been carried on. The work of the section relates in particular to Alabama, Arizona, California, Colorado, Georgia, Idaho, Indiana, Iowa, Kentucky, Michigan, Montana, Nebraska, Nevada, New Mexico, North Carolina, Ohio, Oklahoma, Oregon, Tennessee, Texas, Utah, Virginia, and West Virginia.

8. The section of the geology of eastern coal fields—G. H. Ashley, geologist, in charge—conducts examinations of areas east of the one hundredth meridian that contain coal. The work of the section dur-

ing the year has been done in cooperation with the State surveys of Illinois, Ohio, Pennsylvania, Tennessee, and Virginia.

9. The section of the geology of western coal fields—M. R. Campbell, geologist, in charge—conducts examinations and surveys in the coal-bearing regions west of the one hundredth meridian, similar to those made by the section of eastern coals. The greater part of the work of the western section has consisted in classifying and mapping coal lands of the public domain in Colorado, Montana, New Mexico, Utah, Washington, and Wyoming.

10. The section of the geology of oil and gas fields—David White, chief geologist, in charge—is engaged in the examination of the geologic structure and oil and gas indications in areas which are thought to have promise of oil and gas; in studies of the mode of occurrence and mutual relations of oil, gas, and water, and their relation to the structure and to the character and composition of the sands in developing pools; in observation of the chemical relations between oil, water, and the sediments in oil fields; and in the investigation and utilization of hydrocarbon or oil shales. During the year work has been done in or reports written on areas in Alabama, Arkansas, California, Colorado, Florida, Georgia, Indiana, Kentucky, Louisiana, Mississippi, Missouri, Montana, Nevada, New Mexico, Ohio, Oklahoma, Pennsylvania, South Dakota, Texas, Utah, West Virginia, and Wyoming.

11. The section of the geology of iron and steel alloy metals—E. F. Burchard, geologist, in charge—was established in April for the purpose of conducting examinations and economic surveys of deposits of iron and the ores of the alloy metals—chromite, manganese, tungsten, molybdenum, nickel, vanadium, etc. It is essentially a war-metal section. Its work in the search for, classification and estimation of, and assistance in the development of deposits of the alloy metals, now largely imported and most indispensably necessary to the conduct of the war, has extended to Alabama, Arizona, Arkansas, California, Colorado, Georgia, Iowa, Minnesota, Oregon, Tennessee, Utah, and Virginia.

The section of geologic-map editing—G. W. Stose, geologist, in charge—is a part of the publication branch, but its work is so intimately associated with the work of the individual geologists in the division of geology that it is administered as a part of the geologic branch, in which the chief of the section is an active geologist, whose geologic field investigations are reported in the sections to which they pertain. The office work of this section is described on pages 159–160.

ASSISTANCE TO OTHER DIVISIONS.

In addition to performing work in their respective sections, a considerable number of the geologists in the sections of metalliferous and

nonmetalliferous deposits and several geologists in the sections of eastern and western areal geology have prepared for publication, in the annual volumes of Mineral Resources, reports on the production and statements of the industrial conditions relating to a large number of mineral resources with which they are especially familiar.

The paleontologists of the division report on fossils collected by the division of Alaskan mineral resources and are called upon to classify fossils for the National Museum and occasionally for foreign Governments and for other scientific institutions.

Close cooperation, with constant interchange of information, exists between the geologic branch and the water-resources branch in the investigation of underground-water movements and supplies and of sedimentary deposition. Members of the land-classification board serve in the geologic field parties, and a number of economic geologists of this division serve as members of the special committees of the land-classification board.

COMMITTEE ON GEOLOGIC NAMES.

The committee on geologic names is a standing committee of the geologic branch and consists of T. W. Stanton (chairman), G. W. Stose, W. T. Lee, Sidney Paige, and L. W. Stephenson. The chiefs of section of the division of geology and the chief of the division of Alaskan mineral resources also serve as associate members, each of whom is invited to attend meetings at which matters pertaining to his section or division are under consideration. Authors of manuscripts under discussion are expected to be present or to select someone to present their views. On each question the individual opinions of the persons present are recorded and forwarded to the chief geologist, who makes the decision, subject to appeal to the Director. The records are kept by the secretary, Miss M. G. Wilmarth, who also examines all manuscripts submitted for publication and compares the geologic nomenclature and classification used in them with the standards in current use by the Geological Survey. During the year 117 manuscripts, comprising 17,900 pages and involving about 3,190 geologic names, have been examined. Good progress has been made in preparing the manuscript of a stratigraphic lexicon of geologic formations and in compiling general correlation charts.

COMMITTEE ON PHYSIOGRAPHY.

The physiographic committee, one of the standing committees of the geologic branch, was reorganized March 1, 1916, and now consists of M. R. Campbell (chairman), F. E. Matthes, O. E. Meinzer, E. W. Shaw, and P. S. Smith. One of the important duties of the committee is to examine and pass upon papers of a physiographic char-

acter or chapters on physiography in other papers. In accordance with these instructions the committee has during the year examined, corrected, and approved 10 folio texts, 5 water-supply papers, and 5 papers of a general geologic character. The committee submitted and recommended for publication a descriptive text for the back of the Mount Rainier National Park map, prepared by F. E. Matthes.

During the year the chief geologist approved the map prepared by the Association of American Geographers, showing the physiographic provinces of the United States, and copies were distributed to geologists with the statement that the committee was prepared to consider all suggestions regarding alteration of boundary lines or changes in nomenclature. Some progress has been made in delineating these lines in greater detail. Progress has also been made in collecting and carding definitions of physiographic terms for the use of the committee in preparing new and standard definitions.

The physiographic committee, in conjunction with the geography committee of the National Research Council, has begun the preparation of a series of geographic handbooks containing information regarding the geology and physiography of the country useful in both general and military instruction. Two such handbooks have been undertaken—one for New England and one for the Middle Atlantic States of Virginia, West Virginia, Maryland, and Delaware. It is hoped that these will be completed at an early date, so that they may be available at the military training camps.

GENERAL SUMMARY OF GEOLOGIC WORK.

The geologic work of the division has extended into every State, the Canal Zone, and the West Indies. Systematic detailed surveys in metal-mining districts were carried on in Arizona, California, Minnesota, Nevada, New Mexico, and Utah, and reconnaissance studies of metal-mining districts were made in Alabama, Arizona, Colorado, Idaho, Kansas, Missouri, Montana, Nevada, New Mexico, Oklahoma, Oregon, Tennessee, Utah, Virginia, Washington, and Wyoming. Potash and nitrate prospects were investigated in the States containing semiarid regions, in the "Red Beds" region of the Southwest, and through the analytical testing of brines coming from many oil, water, and salt wells in other portions of the country. Other nonmetalliferous deposits of one kind or another were investigated in nearly every State. Coal fields were examined in Colorado, Illinois, Montana, New Mexico, Ohio, Pennsylvania, Tennessee, Utah, Virginia, Washington, and Wyoming; and studies with mapping of structure with reference to oil and gas were made in Alabama, California, Colorado, Florida, Georgia, Illinois, Kentucky, Louisiana, Mississippi, Montana, New Jersey, New Mexico, Oklahoma, Pennsylvania, Texas, Virginia, and Wyoming. Reports describing mineral

deposits previously examined in other States and not mentioned above are now in preparation. General and detailed geologic and paleontologic work was continued in all regions of the country, including a large amount of geologic work in connection with the examination of the economic resources just mentioned. Work in classifying lands of the public domain and of Indian reservations was carried on in Arizona, California, Colorado, Idaho, Montana, New Mexico, North Dakota, Oregon, Utah, Washington, and Wyoming.

During the year the geologists engaged in examinations requiring areal geologic mapping or in classifying the lands have covered 28,500 square miles with exploratory and reconnaissance surveys and 6,701 square miles with geologic mapping in detail.

Field examinations for the classification of lands in the public-land States have extended over 22,875 square miles.

WORK OF THE DIVISION BY STATES.

ALABAMA.

Examinations of the marbles of Alabama were completed by T. N. Dale, who has nearly finished the Alabama section of a report on the marbles of the southern Appalachian region.

The Hatchetigbee uplift, in Choctaw, Clarke, and Washington counties, was studied and mapped by O. B. Hopkins, whose report on the oil and gas prospects of the area (Bulletin 661–H) is now in the hands of the printer.

At the suggestion of the Weather Bureau, Mr. Hopkins investigated the geologic structure and the evidence of disturbance caused by the earthquake of October 18, 1916, in the region of Pell City and Ironaton, Ala. A report showing the movement to have taken place along an old fault, seen near Ironaton, was transmitted to and published by the Weather Bureau.

In May, 1917, a structural reconnaissance along Chattahoochee River below Columbus was carried out by Mr. Hopkins and C. W. Cooke for the purpose of testing the reported presence of an anticline. Mr. Cooke, with T. W. Vaughan, prepared a digest of the ground waters of Alabama for the use of the War Department.

A monograph entitled "Later Eocene fossil plants of southeastern North America," by E. W. Berry, transmitted for publication, contains descriptions of the later Eocene floras of the State; and a "Monograph of North American early Tertiary cheilostome Bryozoa," by F. Canu and R. S. Bassler, transmitted for publication, contains accounts of Eocene and lower Oligocene Bryozoa from Alabama.

The Catahoula formation of the State is discussed by G. C. Matson in a paper entitled "The Catahoula sandstone" (Professional Paper

98–M), and the Citronelle formation is discussed by Mr. Matson in a paper on "The Pliocene Citronelle formation of the Gulf Coastal Plain" and by Prof. E. W. Berry in a paper on "The flora of the Citronelle formation" (both in Professional Paper 98–L). A reconnaissance of the bauxite deposits of the State was made by J. M. Hill, and a brief paper on the Gold Log mine, Talladega County, by E. S. Bastin, was published as Bulletin, 640–I.

The texts for the Bessemer-Vandiver and Montevallo-Columbiana folios have been submitted by Charles Butts and are now in process of criticism.

Manganese and ore deposits in Murphrees Valley, northeast of Birmingham, were examined in the fall of 1916 by E. F. Burchard, who also sampled three deposits of gray iron ore near Sylacauga for analysis for potash content.

A brief reconnaissance of the graphite deposits in Chilton, Clay, and Talladega counties was made by H. G. Ferguson in the spring of 1917.

ARIZONA.

The preparation of a professional paper on the copper deposits of the Ray and Miami districts was continued when administrative duties permitted, by F. L. Ransome, and has been practically completed. The work done also contributes largely toward the Ray folio, which Mr. Ransome has in hand. A paper on "Some Paleozoic sections in Arizona," prepared by Mr. Ransome, appeared as Professional Paper 98–K.

A field investigation of some of the gypsum deposits of this State was made by R. W. Stone, the results being incorporated in a general report on "The gypsum deposits of the United States."

Studies of the stratigraphy and historical geology of a portion of the Grand Canyon of the Colorado were continued by L. F. Noble, who, with the late J. F. Hunter, jr., prepared a paper entitled "A reconnaissance of the Archean complex of the Granite Gorge, Grand Canyon, Ariz." (Professional Paper 98–I).

A report of a geographic and hydrographic reconnaissance of parts of Arizona, New Mexico, and Utah, by Prof. H. E. Gregory, has been published as Water-Supply Paper 380, under the title "The Navajo country." A more extended paper by Prof. Gregory on the geology and geography of the region is now in course of publication as Professional Paper 93.

During the fall and winter of 1916 F. C. Schrader made an examination of lands on the Gila Reservation as to their mineral or nonmineral character for the Office of Indian Affairs.

Deposits of tungsten and other rare metals in various parts of the State were investigated by F. L. Hess in the spring of 1917.

ARKANSAS.

A digest of the ground waters of the Coastal Plain of Arkansas, for the use of the War Department, was prepared by L. W. Stephenson.

A monograph entitled "Later Eocene fossil plants of southeastern North America," by E. W. Berry, transmitted for publication, contains data on the later Eocene of Arkansas.

A study of the lead and zinc deposits in the Yellville quadrangle was made by E. F. Burchard. The results will be published in the Yellville folio. The Hot Springs folio, by H. D. Miser, has been revised in order to incorporate results of the field work of the previous season and is now being prepared for publication. During the field season Mr. Miser completed the mapping of terrace deposits and Trinity gravels in the DeQueen and Caddo Gap quadrangles and revised some mapping in the northwest corner of the Caddo Gap quadrangle. The text for the folio covering these quadrangles is nearly completed. Mr. Miser also made an examination of antimony mines at Gillham, of the lead and zinc mine at Davis, and of manganese deposits in the Caddo Gap and DeQueen quadrangles. A report by him on the manganese deposits of these quadrangles is now in press.

During the year the Eureka Springs-Harrison folio, by A. H. Purdue and H. D. Miser, has been published. These geologists also have in preparation a report on "Asphalt deposits of Pike and Sevier counties, Ark." A report by them on the "Gravel deposits of the Caddo Gap and DeQueen quadrangles" has been transmitted for publication, and a report on "Diamond-bearing peridotite in Arkansas" is in course of preparation by Mr. Miser.

Collections of invertebrates from formations of Chester and Pottsville age were obtained by G. H. Girty, who continued the description of the fauna of the Morrow formation. Paleozoic invertebrate fossils from the Yellville quadrangle were studied by E. O. Ulrich.

The structure at several places in the Arkansas coal field was examined by David White, who sampled the coals and richly carbonaceous shales at a number of points in the Fayetteville quadrangle and in the northwest corner of the State in order to obtain evidence as to the possibility of finding productive oil pools in the area.

Analyses of greensands, sampled to show their potash content, are given in Bulletin 660–B, by G. H. Ashley.

CALIFORNIA.

A paper on tungsten deposits of northwestern Inyo County, prepared by Adolph Knopf, was issued as Bulletin 640–L. A geologic reconnaissance report on the Inyo Range and the eastern slope of the

Sierra Nevada (Professional Paper 110), submitted by Mr. Knopf, is ready for publication.

A geologic examination of the reported strontium deposits near Barstow was made by Mr. Knopf, who submitted a brief report on the matter for incorporation in the statistical report on strontium in 1916, by J. M. Hill. A more complete statement has been submitted by Mr. Knopf for publication in "Contributions to economic geology." Newly discovered strontium deposits in San Bernardino and Imperial counties were examined by F. L. Hess.

Many potash projects about San Francisco and Los Angeles, the six plants obtaining potash from kelp near San Pedro, and the two plants near San Diego were visited by H. S. Gale.

The investigations of California oil fields were continued. The area of the Salinas Valley mapping was extended by W. A. English, who covered, either in detail or detailed reconnaissance, the larger part of the San Miguel and Cholame quadrangles and portions of the Paraiso Springs, Priest Valley, Coalinga, Lost Hills, and McKittrick quadrangles. His report on the "Geology and oil prospects of the Salinas Valley–Parkfield area" is ready for review and publication.

A special detailed study of the Belridge–Lost Hills district was carried through by R. W. Pack and Mr. English. The mapping and general description of the geology has been finished by Mr. English, but completion of the report is delayed by the resignation of Mr. Pack to enter private service. A report on the geology of the Sunset-Midway field, by Mr. Pack, is nearly ready for submission.

The results of the study of the water conditions with reference to the oil and the structure of the sands in the Coalinga field, by G. S. Rogers, are embodied in a report almost completed but interrupted on account of the assignment of Mr. Rogers to similar field examinations in the Gulf Coastal Plain.

Materials embracing manuscript and maps for a folio covering the Ventura district have been submitted in preliminary draft by Ralph Arnold, by whom the work was begun before his resignation from the Survey. In these studies Dr. Arnold has been assisted by W. A. Pemberton, who is joint author. The region of new development to the east of that covered by Messrs. Arnold and Pemberton was visited near the end of the year by W. S. W. Kew, who, assisted by J. A. Buwalda, will extend the structural investigations. A report by G. S. Rogers on the "Chemical relations of the oil-field waters of the San Joaquin Valley, Cal.," has been issued as Bulletin 653.

Description of the Tertiary invertebrate faunas of California and other Pacific Coast States was continued by W. H. Dall; a report on Tertiary plants from Marysville Buttes was made by F. H. Knowl-

ton; and Cretaceous invertebrates from the west side of San Joaquin Valley were identified by T. W. Stanton.

The geologic studies in the Yosemite National Park, undertaken for the preparation of a popular guide to the geology of the park, were completed by F. E. Matthes and F. C. Calkins. Mr. Matthes devoted his time to detailed studies of the ancient Tuolumne Glacier and distinguished two periods of glaciation. He also gave particular attention to the physiography of the region, mapping in detail about 190 square miles and on a reconnaissance scale about 50 miles. Mr. Calkins completed detailed studies of the bedrock geology, mapping 30 square miles in detail and 95 square miles on a reconnaissance scale. He also made a detailed study of a section of Merced River from the Great Valley to Yosemite Park. These two geologists are preparing a professional paper which will describe this region, with a cross section from the Great Valley of California across the Sierra Nevada.

Chromite, of which California is by far the greatest producer, was the subject of an exhaustive investigation by J. S. Diller, who made a reconnaissance survey of about 2,000 square miles, studying the sources of supply and endeavoring to increase the production.

The mild volcanic activities of Lassen Peak continued, and during July and August Mr. Diller made a reconnaissance of about 400 square miles in this region, gathering data for a bulletin on the Lassen Volcanic National Park, which is now well advanced.

The field work for a comprehensive report on the "Physiography and geology of southern California" has been completed under agreement by R. T. Hill, and office work on its preparation is far advanced.

The detailed mapping for a folio on the Mariposa quadrangle was begun by J. F. Hunter, jr., who covered about 400 square miles. Mr. Hunter lost his life by accidental drowning May 23, 1917, while engaged in field examinations in Georgia.

A study of the Tertiary formations adjacent to the Mohave Desert was undertaken by L. F. Noble and R. E. Dickerson late in June, with a view to establishing the relations between the continental and marine Tertiary formations in southern California. Mr. Noble continued detailed studies of the Rock Creek, San Antonio, and Hesperia quadrangles, mapping in all about 55 square miles. It is planned to publish a paper on that part of these quadrangles adjacent to the great San Andreas rift zone.

To confirm the report that the oil-bearing shales in the Tertiary formations of California, notably in Ventura County, were capable of yielding large quantities of oil on distillation, field examinations were made by D. E. Winchester, W. A. English, and L. F. Noble, who collected samples for distillation tests by the Bureau of Mines.

Professional Paper 98–T, "The reef-coral fauna of Carrizo Creek, Imperial County, Cal., and its significance," by T. W. Vaughan, con-

tains an account of a coral fauna of purely Atlantic affinities at the head of the Gulf of California.

Descriptions of molybdenite near Ramona and of an occurrence of nickel ore in San Diego County are given by F. C. Calkins in Bulletin 640–D.

Glacial studies were carried on in the Yosemite Valley and vicinity from July 8 to 15 by Frank Leverett, in connection with a western trip.

COLORADO.

The study of the physiographic history of the San Juan Mountains and the mapping of the Quaternary formations within that range were continued during the field season by W. W. Atwood, assisted by K. F. Mather and Arthur Iddings. While this work has been in progress a number of serious engineering problems have been encountered in connection with the reservoir sites in the eastern portion of the range. Most of these reservoirs are in mountain canyons, and the sites for the dams have been selected where the valleys are somewhat constricted, either by glacial moraines or landslide deposits. A special study of the geology associated with these reservoir sites has been made, and a report has been submitted by Mr. Atwood, entitled "Relations of landslides and glacial deposits to reservoir sites in the San Juan Mountains."

In the Creede, Summitville, and Del Norte quadrangles the detailed examination and mapping of the Quaternary formations was completed for an era of 1,600 square miles. Reconnaissance examinations were made in an area of 150 square miles bordering the Del Norte quadrangle.

Studies of the igneous rocks in the San Juan region were continued by E. S. Larsen under the general supervision of Whitman Cross. Exploratory examinations covered about 700 square miles, and a detailed reconnaissance was also made covering about 600 square miles in the Del Norte quadrangle and adjoining areas.

A reconnaissance of about 400 square miles in and near the Rocky Mountain National Park was made by W. T. Lee, who submitted a popular descriptive report thereon for publication by the National Park Service. About 500 square miles in northeastern Colorado was covered by Mr. Lee in exploratory examinations for the investigation of the stratigraphy of the Cretaceous rocks along the western foothills of the Rocky Mountains. Mr. Lee submitted a report entitled "Notes on the Jurassic and Cretaceous of the Rocky Mountains" and a paper entitled "Physiography of the Rocky Mountain National Park."

The detailed report on the "Economic geology of Gilpin County and adjacent parts of Clear Creek and Boulder counties," by E. S.

Bastin and J. M. Hill, appeared during the year as Professional Paper 94. Gilpinite, a new uranium mineral from this region, has been described by E. S. Larsen in an unofficial publication.

A chapter on the oxidized zinc ores of Leadville, by G. F. Loughlin, has been transmitted for inclusion in the monograph on the Leadville district, the text for which has just been submitted to the Survey by J. D. Irving.

Special inquiry was made into the reported discovery of very extensive deposits of alunite, which has been viewed as a possible source of potash, on Pintados Peak, in the San Juan Mountains, southern Colorado.

The question of the practicability of developing a source of nitrate from the "brown spots" in Colorado was investigated by H. S. Gale, in conference with Prof. W. P. Headden, of the State Experiment Station, Fort Collins. Mr. Gale also examined numerous reported discoveries of potash and nitrate in the vicinity of Denver.

In order to procure data as to the value of certain mine tailings as possible sources of potash, samples of potash-rich tailings from dumps of mills in the vicinity of Cripple Creek were collected by F. L. Hess for more detailed study.

A monograph on the Laramie flora of the Denver Basin was submitted for publication, and the description of the flora of the Denver formation was nearly completed by F. H. Knowlton, who also wrote a paper on a dicotyledonous flora from the type section of the Morrison formation. Cretaceous invertebrates from northern Colorado were reported on by T. W. Stanton.

The Colorado Springs folio (No. 203), by G. I. Finlay, was issued during the year.

The reconnaissance examinations of the oil shales in northwestern Colorado and northeastern Utah, with field tests to determine their capacity to yield petroleum by destructive distillation, were continued by the party in charge of D. E. Winchester. Some of the preliminary results of the work of this season were combined with the report for the preceding season and published as Bulletin 641–F. Interest in the possibilities of these oil shales has been so widespread that it was found necessary to print a second edition of the bulletin. Additional data are contained in a paper just submitted by Mr. Winchester, giving the results of his searches for oil shale in Utah and Nevada also.

CONNECTICUT.

The study of the geology of southern Connecticut was in the spring of 1917 continued by the Geological and Natural History Survey of Connecticut under the direction of Prof. H. E. Gregory, in cooperation with the Federal Survey.

The geography of this State is being described for a manual of the geography of New England, a popular report, designed also for military use, now in preparation in cooperation with the geography committee of the National Research Council. The work is done by W. M. Davis for the Council and by Arthur Keith for the Survey.

DELAWARE.

The folio on the Elkton and Wilmington quadrangles, including parts of Pennsylvania and Maryland, is in course of publication.

Analyses of greensands from several parts of the State, sampled to show their possible value as sources of potash, are given by G. H. Ashley in a report entitled "Notes on the greensand deposits of the eastern United States" (Bulletin 660–B).

FLORIDA.

G. C. Matson discusses the Catahoula formation in Florida in a paper entitled "The Catahoula sandstone" (Professional Paper 98–M), and the Citronelle formation in a paper on "The Pliocene Citronelle formation of the Gulf Coastal Plain" (Professional Paper 98–L).

A digest of the ground waters of Florida was prepared, for the use of the War Department, by C. W. Cooke and T. W. Vaughan.

A manuscript on the stratigraphic position and faunal associates of species of orbitoid Foraminifera of the genus *Orthophragmina* from Georgia and Florida, by C. W. Cooke, and one on the species of *Orthophragmina* from the Eocene of Florida and Georgia, by J. A. Cushman, were transmitted for publication (Professional Paper 108–G).

A "Monograph of North American early Tertiary cheilostome Bryozoa," by F. Canu and R. S. Bassler, transmitted for publication, contains descriptions of upper Eocene and lower Oligocene Bryozoa.

A report on the Mollusca of the Alum Bluff formation, by Miss Julia Gardner, is almost completed. An investigation of the fossil corals of the southeastern United States, including Florida, was continued by T. W. Vaughan. A paper "On reported Pleistocene human remains at Vero, Fla.," by Mr. Vaughan, appeared in the Journal of Geology, December, 1916.

A study of the mechanical composition of Recent sediments from Florida, by E. W. Shaw, is in progress. A paper on the fauna and correlation of the Nashua marl was written by W. C. Mansfield, and several collections of Tertiary invertebrates were reported on by W. H. Dall.

In June an examination of the geologic structure and of reported oil and gas indications in the western part of the State was begun at

the request of the State geologist, who cooperated with O. B. Hopkins, of this Survey, in the field investigations.

GEORGIA.

At the request of the State geologist of Georgia an examination of the reported oil and gas and structural indications in southern Georgia was made by a cooperative party in which the Federal Survey was represented by O. B. Hopkins, C. W. Cooke, and J. F. Hunter, jr. The principal results of the investigation, which covered the region along Chattahoochee River from Columbus to Alaga and portions of Decatur, Miller, and Grady counties, have been communicated for publication by the daily press.

Field work and a part of the office work in connection with the preparation of a chapter on the marbles of Georgia was accomplished by T. N. Dale. The results are to be incorporated with other material in a comprehensive report on the "Marbles of the Southern States."

A reconnaissance of the bauxite deposits of the State was made by J. M. Hill, and field examinations of some of the feldspar deposits of Georgia, with special reference to their potash contents, were made by F. J. Katz.

A report entitled "Deposits of Claiborne and Jackson age in Georgia," by C. W. Cooke, of this Survey, and H. K. Shearer, of the Geological Survey of Georgia, was completed and has been submitted for publication as a part of Professional Paper 120.

A digest of the ground waters of the Coastal Plain of Georgia and geographic data relating to a part of the Coastal Plain were compiled by L. W. Stephenson, for the use of the War Department.

A manuscript on the stratigraphic position and faunal associates of species of orbitoid Foraminifera of the genus *Orthophragmina*, by C. W. Cooke, and one on the species of *Orthophragmina* from the Eocene of Florida and Georgia, by J. A. Cushman, were submitted for publication (Professional Paper 108–G).

A monograph entitled "Later Eocene fossil plants of southeastern North America," by E. W. Berry, transmitted for publication, contains descriptions of upper Eocene fossil plants from Georgia; and a "Monograph of North American early Tertiary cheilostome Bryozoa," by F. Canu and R. S. Bassler, also transmitted for publication, contains accounts of Eocene and lower Oligocene Bryozoa from the State.

The study of the Tertiary corals of Georgia was continued by T. W. Vaughan.

IDAHO.

Widely scattered mining regions in Idaho were visited during the field season of 1916 by J. B. Umpleby and E. L. Jones, who col-

lected data for a general report on the ore deposits of Idaho. The field work upon which this report will be based is now completed, and the manuscript and necessary maps are in preparation.

A detailed report on the "Geology and ore deposits of the Mackay region," by J. B. Umpleby, has been recently issued as Professional Paper 97. A short report on "Lode mining in the Quartzburg and Grimes Pass porphyry belt, Boise Basin," by E. L. Jones, appeared as Bulletin 640–E, and a report on the Pine Creek district, accompanied by a geologic sketch map, also by Mr. Jones, has been submitted for publication.

A history of mining development in Idaho, which was prepared by Dr. W. P. Jenney under agreement, will be utilized in the forthcoming report on the geology and ore deposits of the State, by Messrs. Umpleby and Jones.

Detailed examinations of the phosphate deposits, with mapping of about 400 square miles, in the Henry, Cranes Flat, and Portneuf quadrangles were made by G. R. Mansfield. Field work in the Henry and Cranes Flat quadrangles was completed, both for areal mapping and for phosphate-land classification. Mr. Mansfield began during the winter the preparation of a professional paper on southeastern Idaho, covering the Montpelier, Slug Creek, Crow Creek, Lanes Creek, Freedom, Portneuf, Henry, and Cranes Flat quadrangles. The Carboniferous and Lower Triassic faunas of southeastern Idaho were discussed and characteristic species illustrated by G. H. Girty in a chapter to be embodied in this paper. Collections of Jurassic and Cretaceous invertebrates from southeastern Idaho were reported on by T. W. Stanton.

Mr. Mansfield revised the manuscript of his paper on the Fort Hall Indian Reservation, submitted for publication several years ago.

The text of the Hailey folio has been practically completed by Prof. L. G. Westgate. The Silurian and Ordovician graptolites of the quadrangle have been described by Edwin Kirk for publication in Prof. Westgate's report on the geology of the quadrangle.

A nitrate deposit in the Lanes Creek quadrangle, reported to the Survey by letter, was visited by G. R. Mansfield and found to be not of commercial size and quality.

A paper on the "Genesis of the Success zinc-lead deposit, Coeur d'Alene district," by J. B. Umpleby, has been transmitted for unofficial publication.

ILLINOIS.

The geology of the Shawneetown, Golconda, and Equality quadrangles, in the southern part of Illinois, was examined by Charles Butts, who mapped portions of the Equality quadrangle in detail, the work being carried on in cooperation with the State Geological Sur-

vey. A report on "Structure favorable to oil and gas accumulation in Hardin County, Illinois," was prepared by Mr. Butts for publication by the State.

The stratigraphy and paleontology of the Chester group, in Illinois and Kentucky, were studied by G. H. Girty and E. O. Ulrich in a field conference in which G. H. Ashley, F. W. DeWolf, and Stuart Weller also participated. Independent studies of the faunas were subsequently made by all the paleontologists, and a special study of the *Pentremites* was made by E. O. Ulrich.

The manuscript on the Quaternary geology of the Gillespie and Mount Olive quadrangles, prepared for folio publication by Wallace Lee, was revised somewhat by Frank Leverett and W. C. Alden, and the folio is now ready for publication.

INDIANA.

At the request of the Office of the Supervising Architect of the Treasury Department and the Indiana Limestone Quarrymen's Association a field investigation of the so-called Bedford or Salem limestone of Indiana was undertaken by G. F. Loughlin, for the purpose of defining and establishing the grading of the limestone. Tests on the materials collected by Mr. Loughlin are now in progress by the Bureau of Standards, also cooperating. It is expected that the State will join in the work through the areal mapping of the deposits.

A report of the distillation tests of certain of the richly bituminous shales of the State for the purpose of ascertaining their possible yield of oil is given by G. H. Ashley in Bulletin 641–L, "Oil resources of black shales of the eastern United States."

IOWA.

The study of the evidence of an Iowan stage of glaciation, a cooperative investigation by W. C. Alden and M. M. Leighton for the Federal and Iowa geological surveys, respectively, was completed and transmitted to the Iowa Survey for publication.

The iron-ore deposit at Waukon, recently developed and brought to production by improved methods of concentration, was examined by E. F. Burchard in June.

KANSAS.

Examinations of the geologic structure in the region of southern Kansas immediately north of the State line in the vicinity of the Pawhuska quadrangle were made by K. C. Heald in connection with his mapping of the structure of the northwest corner of the quadrangle.

Carboniferous invertebrates from the State were described by G. H. Girty.

Areas in western Kansas that are possibly structurally favorable for the occurrence of oil or gas are described by N. H. Darton in a paper now in process of publication.

KENTUCKY.

A report on the phosphate deposits of Kentucky was completed and transmitted for publication by W. C. Phalen, who was temporarily transferred from the Bureau of Mines in order to complete the work. This report was prepared in cooperation with the State Geological Survey of Kentucky and has been submitted to that organization for publication.

The invertebrates of the Chester group in the State were studied by G. H. Girty and E. O. Ulrich in continuance of the work of the field conference mentioned under the heading "Illinois." The boundary between the Cincinnatian and the Mohawkian was studied in the field by Mr. Ulrich in cooperation with Prof. A. M. Miller, of the University of Kentucky.

A detailed reconnaissance of the stratigraphy and correlation of the Mississippian formations in west-central Kentucky was made by Charles Butts, in cooperation with the State Geological Survey. The report by Mr. Butts, which will be transmitted for publication by the State, is nearing completion. The work is closely related with the work being carried on by Mr. Butts in southern Illinois.

Structural examinations of a part of Allen County were made early in the season by E. W. Shaw and K. F. Mather. A brief statement of the principal conclusions was promptly given publicity, and a report discussing the oil and gas possibilities of the region is now in process of publication.

A report on the structure and oil prospects of the Irvine district by Mr. Shaw is now in press as Bulletin 661-D.

LOUISIANA.

A digest of the ground waters of the Coastal Plain of Louisiana, for the use of the War Department, was prepared by L. W. Stephenson. The manuscript of a report on the clays of Louisiana, by G. C. Matson (Bulletin 660-E), was finished and submitted for publication.

An examination of the sulphur deposits of the State, with special reference to their use in the manufacture of sulphuric acid, was made by P. S. Smith.

The Catahoula formation in Louisiana is discussed by G. C. Matson in a paper entitled "The Catahoula sandstone" and by Prof. E. W. Berry in a paper entitled "The flora of the Catahoula sandstone," both in Professional Paper 98-M, and the Citronelle forma-

tion is discussed by Mr. Matson in a paper on "The Pliocene Citronelle formation of the Gulf Coastal Plain" (Professional Paper 98–L).

A monograph entitled "Later Eocene fossil plants of southeastern North America," by E. W. Berry, transmitted for publication, contains descriptions of fossil plants from Louisiana. Eocene invertebrates from the State were identified by W. H. Dall.

In connection with the study of the structure, lithology, and chemistry of the salt domes of the Gulf Coastal Plain examinations of the salt domes in the region of New Iberia were made in June, 1917, by G. S. Rogers.

A report describing the structure and discussing the oil resources of the De Soto–Red River region, by G. C. Matson and O. B. Hopkins, has been issued as Bulletin 661–C.

Inspections of the surficial geology and structural criteria at several points in eastern Louisiana were made in the winter of 1916 by O. B. Hopkins.

MAINE.

The raised Pleistocene shore line in the Portland, Gray, and Buxton quadrangles, Maine, was studied and mapped by F. J. Katz, who also made a reconnaissance examination of part of the Buxton and all of the Berwick and Kennebunk quadrangles. The results of these studies have been incorporated in the Portland–Casco Bay folio, which is being prepared. The study of similar shore lines in the Dover and York quadrangles and of the general areal geology of the Dover quadrangle was continued by Mr. Katz. A field conference was held with Arthur Keith and Laurence LaForge.

A paper on the "Stratigraphy in southwestern Maine and southeastern New Hampshire," by Mr. Katz, is in course of publication as Professional Paper 108–I, and a paper on the Newington moraine, also by Mr. Katz, has been issued as Professional Paper 108–B.

Feldspars at several points in the State were sampled by Mr. Katz to determine their value as possible sources of potash.

MARYLAND.

Office work on the maps and description of the Williamsport quadrangle, which will be a part of the Williamsport-Hagerstown folio, has been well advanced by G. W. Stose. This folio will be published in cooperation with the Maryland Geological Survey, but the quadrangle includes portions of Pennsylvania and West Virginia.

The folio for the Elkton and Wilmington quadrangles, including parts of Delaware and Pennsylvania, prepared by Florence Bascom and B. L. Miller, also in cooperation with the Maryland Geological Survey, is in course of publication. The Tolchester folio (No. 204),

by B. L. Miller, E. B. Mathews, A. B. Bibbins, and H. P. Little, also cooperative, has been published.

At the request of the United States Geological Survey a digest of the ground waters of Maryland was prepared for the use of the War Department by Prof. W. B. Clark, State geologist of Maryland.

A "Monograph of North American early Tertiary cheilostome Bryozoa," by F. Canu and R. S. Bassler, transmitted for publication, contains descriptions of early Tertiary Bryozoa from formations in this State.

MASSACHUSETTS.

A report on the physiography, geology, and ground waters of Cape Cod, Nantucket, Marthas Vineyard, Block Island, and the Elizabeth Islands was completed and submitted by Prof. J. B. Woodworth, who also prepared a digest of the water resources of Cape Cod and the islands off the coast of Massachusetts and Rhode Island for the use of the War Department. The field mapping was inspected by T. W. Vaughan in conference with Prof. Woodworth.

Detailed studies of the Cambridge slate, of Pleistocene lake history, and of obscure points in bedrock geology in the Boston and Boston Bay quadrangles were made by Laurence LaForge. Mr. LaForge made reconnaissance examinations of the rocks in parts of the Lawrence and Salem quadrangles, investigated the late Pleistocene submergence of the coast near Newburyport, and carried on semidetailed mapping of the igneous rocks in the northern part of the Newburyport quadrangle. In much of this area Mr. La Forge was accompanied by Arthur Keith. During the field work Mr. LaForge found abundant evidence of a late Pleistocene submergence of northeastern Massachusetts and southeastern New Hampshire to a depth of at least 120 feet in the Merrimack estuary. This evidence is probably to be correlated with the evidence of submergence to a depth of 150 to 170 feet in the Piscataqua estuary, as recently worked out by Mr. Katz.

The mapping of the surface geology of the Groton quadrangle was continued during the field season by Prof. B. K. Emerson. During part of the time Prof. Emerson was in field conference with Mr. Keith and Mr. LaForge. Work on the revision of the texts and maps for the Fitchburg-Groton folio is well advanced toward completion. The text and maps for the Warwick-Winchendon folio are also well advanced. During April, May, and June Prof. Emerson was engaged in the preparation of a report on road materials of Massachusetts for the use of the War Department. Material for this report covering northeastern Massachusetts, was furnished by Mr. LaForge.

The areal and economic survey of the Greylock quadrangle was continued by L. M. Prindle, and several days were spent in reconnaissance studies in southwestern Massachusetts by Mr. Keith.

During parts of May and June examinations pertaining to the establishment of the Army camp at Ayer were made at the request of the United States Army officers by Mr. LaForge.

The text and maps for the Boston folio, by Mr. LaForge, are well advanced.

MICHIGAN.

A report on the gypsum deposits of Michigan has been prepared as a part of a bulletin by R. W. Stone on the gypsum deposits of the United States. Records of wells from which bromine is obtained in the Saginaw Valley and much general information concerning the bromine and chemical industries there were obtained by W. C. Phalen.

The manuscript of a report on the glacial moraines and shore lines of the Lake Superior region, by Frank Leverett, was well advanced toward completion.

A folio covering the Wayne, Detroit, Grosse Pointe, Romulus, and Wyandotte quadrangles has been issued as Folio 205.

MINNESOTA.

A report on the surface formations and agricultural conditions of northeastern Minnesota, by Frank Leverett and F. W. Sardeson, has been published as Bulletin 13 of the Minnesota Geological Survey. Proof of a similar report on the southern half of Minnesota, by Mr. Leverett and Mr. Sardeson, for publication by the Minnesota Geological Survey, has been read. These reports are products of the work done in cooperation between the Federal Survey and the Minnesota Geological Survey. They will be followed by a general report on the Quaternary geology of Minnesota by Mr. Leverett.

The glacial moraines and shore lines of the Lake Superior region are described by Mr. Leverett in a manuscript well advanced toward completion.

The cooperative study by this Survey and the State Survey of the iron ores of the Cuyuna range was continued by E. C. Harder as the Federal Survey's representative and A. W. Johnston for the State. One preliminary report, to be published by the State Survey, has been completed and is awaiting examination by the State geologist. Another, entitled "Notes on the geology and iron ores of the Cuyuna district, Minn.," with an outline map of the iron-bearing areas, has been published by this Survey as Bulletin 660–A. A paper on the geologic activity of iron bacteria in the precipitation of iron ores has been submitted by Mr. Harder, and a detailed report on the geology and ores of the Cuyuna range is in preparation.

MISSISSIPPI.

The geologic structure in the region between Vicksburg and Jackson, Miss., has been described by O. B. Hopkins in Bulletin 641–D, the demand for which was so great as to call for reprinting. Mr. Hopkins also made examinations of certain features near Biloxi thought by some to be indications of oil.

The Catahoula formation in the State is discussed by G. C. Matson in a paper entitled "The Catahoula sandstone," and by Prof. E. W. Berry in a paper entitled "The flora of the Catahoula sandstone," both in Professional Paper 98–M, and the Citronelle formation is discussed by Mr. Matson in a paper on "The Pliocene Citronelle formation of the Gulf Coastal Plain" (Professional Paper 98–L).

Reports on the stratigraphy of the Cretaceous deposits of Mississippi and on the ground waters of the northeastern part of the State, by L. W. Stephenson, were practically completed. Manuscripts on the Jackson formation and the Vicksburg group in Mississippi were submitted by C. Wythe Cooke, and a paper on the stratigraphy of the Upper Tertiary of Mississippi, by G. C. Matson, was completed. A report on the Pliocene history of northern and central Mississippi was completed by E. W. Shaw, and is in press as Professional Paper 108–H, and a paper by the same author on the Quaternary history of Mississippi, including an annotated bibliography, was begun. These papers will be published as parts of reports prepared in cooperation with the Mississippi State Geological Survey. The report on the general geology of the State will be published by the State Survey and the one on the ground waters of the State will be published by the Federal Survey.

A paper entitled "Geologic history indicated by the fossiliferous deposits of the Wilcox group (Eocene) at Meridian, Miss.," by E. W. Berry, was published as Professional Paper 108–E, and a monograph entitled "Later Eocene fossil plants of southeastern North America," also by E. W. Berry, transmitted for publication, contains descriptions of the later Eocene plants of the State. A "Monograph of North American early Tertiary cheilostome Bryozoa," by F. Canu and R. S. Bassler, transmitted for publication, gives an account of the Eocene and lower Oligocene Bryozoa of Mississippi.

MISSOURI.

The study of the stratigraphy and paleontology of the Mississippian formations in southeastern Missouri has been continued by the State in cooperation with this Survey, these investigations being a part of a general plan organized and conducted in concert by the

geologists of this part of the Mississippi Valley. A field conference touching a number of the local problems was in August held by representatives of several State surveys and of the Federal Survey.

The text and maps by F. C. Greene for a folio covering the Green City and Queen City quadrangles have been revised and are ready for publication.

The original edition of Bulletin 606, by C. E. Siebenthal, on the "Origin of the zinc and lead deposits of the Joplin region, Missouri, Kansas, and Oklahoma," having been exhausted, this paper has been reprinted.

MONTANA.

Two brief reports describing the Garnet and Dunkleberg districts, based on examinations made in the fall of 1915 by J. T. Pardee of mineral-bearing districts in northwestern Montana, are in press as Bulletins 660–F and 660–G, and others are in preparation.

The general geology and structure of an area embracing 750 square miles in Teton and Lewis and Clark counties were examined and classified with special reference to oil and gas possibilities by Eugene Stebinger, assisted by M. I. Goldman. A report by Mr. Stebinger under the title "Oil and gas geology of the Birch Creek–Sun River area, Mont.," has been transmitted for publication in "Contributions to economic geology, 1918, Part II" (Bulletin 691).

The somewhat complicated structure in a large area northwest of Billings embracing the Hailstone Basin was examined and mapped in detail by E. T. Hancock, who has submitted his classification and a report on the "Geology and oil and gas resources of the Lake Basin field" for publication in the same volume.

A part of the Musselshell Valley embracing 1,200 square miles was examined, classified, and mapped in detail by C. F. Bowen, with the object of obtaining data bearing upon its oil and gas possibilities, Mr. Bowen's report on "Anticlines in a part of the Musselshell Valley, Musselshell, Meagher, and Sweetgrass counties, Mont.," has been submitted for publication in Bulletin 691.

In northeastern Montana an area of about 6,912 square miles near Malta, including what is now known as the Bowdoin dome, was examined in rapid reconnaissance with classification of the lands, by A. J. Collier, whose report on the Bowdoin dome and its oil possibilities is in press as Bulletin 661–E.

A reconnaissance examination in the Yellowstone-Helena region, which includes the Gallatin and Madison national forests, with tracing of the phosphate horizon and the discovery of hitherto unreported beds of workable quality, was carried out by D. D. Condit, assisted by E. H. Finch. A portion of the report on this work has already been

completed by Mr. Finch. Phosphate lands in Granite, Powell, and Deer Lodge counties were examined by J. T. Pardee.

The monograph on the "Geology of the Yellowstone Park," on which Arnold Hague had for many years been engaged and which will constitute his monumental work, was nearly complete at the time of Dr. Hague's death early in May.

A general reconnaissance study of the glacial and associated deposits in Sheridan, Valley, Phillips, and Blaine counties, and adjacent parts of Dawson County was made by W. C. Alden. A study of the literature of these and adjacent regions was made in the office, and a preliminary description was prepared by Mr. Alden.

NEBRASKA.

The more prominent anticlines of western Nebraska are described in a paper by N. H. Darton on the structure of parts of the central Great Plains submitted for publication in Bulletin 691.

The potash plant at Hoffland was examined by H. S. Gale.

NEVADA.

A detailed report on the geology and ore deposits of the Yerington district, Nev., has been submitted for publication as a professional paper by Adolph Knopf.

A report prepared by E. S. Bastin, in collaboration with F. B. Laney, of the Bureau of Mines, on the genesis of the ores of Tonopah, as interpreted from detailed microscopic studies of polished surfaces of the ores, is now in press as Professional Paper 104.

In addition to the report on the placers of Manhattan, H. G. Ferguson has in preparation as a professional paper a report on the geology and ore deposits of Manhattan and vicinity.

Late in the winter Adolph Knopf made a detailed geologic study of the Rochester district and a reconnaissance examination of the Arabia district. A report on the Arabia district is in preparation. A short paper on the ore deposits at Eureka is being prepared by G. F. Loughlin.

The results of an investigation of some of the gypsum deposits of the State by R. W. Stone will be found in a general description of the gypsum deposits of the United States, now ready for publication.

The oil-shale deposits of the Green River group in the vicinity of Elko, Nev., were examined by D. E. Winchester, whose descriptions, with accounts of tests, are contained in a paper now ready for submittal.

About a month was spent in Carson Sink by F. C. Schrader, completing a study of that region for an economic report on the ore deposits.

The following reports relating to mining districts in Nevada have appeared during the fiscal year:

Notes on some mining districts in eastern Nevada, by J. M. Hill (Bulletin 648).

The Golden Arrow, Clifford, and Ellendale districts, Nye County, Nev., by H. G. Ferguson (Bulletin 640–F).

Tin ore in northern Lander County, Nev., by Adolph Knopf (Bulletin 640–G).

Placer deposits of the Manhattan district, Nev., by H. G. Ferguson (Bulletin 640–J).

A paper by Mr. Knopf on "Wood tin in the Tertiary rhyolites of northern Nevada" has been transmitted for unofficial publication.

NEW HAMPSHIRE.

The raised Pleistocene shore lines in the Dover and York quadrangles, in Maine and New Hampshire, were specially studied by F. J. Katz. Reconnaissance studies in part of the Dover quadrangle, and practically all of the Berwick quadrangle were carried on by Mr. Katz, and a field conference was held by him with Arthur Keith and Laurence LaForge in the region about Rochester, N. H., and Berwick, Maine. Mr. LaForge spent two weeks in reconnaissance trips in southeastern New Hampshire and in reconnaissance mapping of Carboniferous stratified rocks west and northwest of Rochester, N. H.

A very brief reconnaissance in southwestern New Hampshire was made by Mr. Keith and a report on Pleistocene fossils from the Leda clays was made by W. H. Dall.

NEW JERSEY.

At the request of this Survey a digest of the ground waters of New Jersey was prepared, for the use of the War Department, by Dr. M. W. Twitchell, assistant State geologist, under instruction from Dr. H. B. Kümmel, State geologist.

The oil and gas explorations and the structural indications in the vicinity of Millville were examined by E. W. Shaw, at the request of the State Geological Survey.

The results of the analysis of greensands sampled at several points in the southern part of the State to show their possible value as sources of potash have been published in a report entitled "Notes on the greensand deposits of the eastern United States," by G. H. Ashley, published as Bulletin 660–B.

NEW MEXICO.

Field studies in the "Red Beds" region of New Mexico, with special reference to the history of their deposition and the possible presence of commercial amounts of potash salts associated with the

thick deposits of salt and gypsum in the series, were continued by N. H. Darton, who is preparing a report on the region and its potash prospects. Exploratory examinations were made of 1,400 square miles, a reconnaissance examination of 820 square miles, and detailed mapping of 76 square miles. Mr. Darton also submitted a report on the gypsum deposits of New Mexico for incorporation in the general report on the gypsum deposits of the United States.

A deep well bored by a private company near Carlsbad was, through the courtesy of the company, visited by R. K. Bailey, who obtained therefrom a series of samples for testing with reference to their potash contents. Nothing of value was found, but as a depth of only 500 feet was attained, the salt beds of the region were not penetrated.

The geology of the Mogollon mining district was mapped in detail by H. G. Ferguson, who, in the fall of 1916, made a study of the ore deposits for a professional paper on that district. Mr. Ferguson also made a reconnaissance examination of the Steeple Rock district, and has in preparation a brief report thereon for inclusion in the annual economic bulletin.

Completion of the report on the copper deposits of the Burro Mountains (Tyrone district), by Sidney Paige, has been delayed by his assignment as geologist in charge of the section of western areal geology.

A detailed report on the copper deposits of the Santa Rita (Chino) district is in preparation by A. C. Spencer after an intermission caused by his assignment to work in Alaska.

Field work for a detailed study of the Magdalena or Kelly district has been completed by G. F. Loughlin. In connection with this investigation, some experimental work was carried out by Prof. W. O. Hotchkiss to determine the possible applicability of magnetic methods of surveying to ore deposits other than those of iron. Prof. Hotchkiss also extended his work to the Hanover and Santa Rita districts. The method was found to promise some usefulness in tracing concealed contacts between igneous and sedimentary rocks.

A paper entitled "A comparison of some Paleozoic sections in southern New Mexico," by N. H. Darton, has been issued as Professional Paper 108–C. Mesozoic invertebrates from the Magdalena limestone were studied by G. H. Girty, and Cretaceous invertebrates from southern New Mexico were reported on by T. W. Stanton, and from northwestern New Mexico by J. B. Reeside, jr.

As scientific by-products of the structural and land classification work in the coal-bearing region of northwestern New Mexico, by C. M. Bauer, J. B. Reeside, jr., and others, the following publications, under the general title "Contributions to the geology and paleon-

tology of San Juan County," have been published as parts 1, Q, R, and S, respectively, of Professional Paper 98:

Stratigraphy of a part of the Chaco River valley, by C. M. Bauer.
Vertebrate faunas of the Ojo Alamo, Kirtland, and Fruitland formations, by C. W. Gilmore.
Nonmarine Cretaceous invertebrates of the San Juan Basin, by T. W. Stanton.
Floras of the Fruitland and Kirtland formations, by F. H. Knowlton.

NEW YORK.

The areal and economic survey of the Berlin quadrangle, including a small part of Massachusetts, was continued by L. M. Prindle, who extended his geologic work into the adjacent Troy quadrangle. The folio covering the Berlin and Greylock quadrangles is nearing completion.

A study of the structure and succession of the rocks in the Hoosick and Cohoes quadrangles was made by Mr. Prindle. This areal work was reviewed by Arthur Keith, who also made a brief reconnaissance study of the formations in southeastern New York.

NORTH CAROLINA.

Feldspar deposits in the Spruce Pine district were examined by F. J. Katz in connection with his examination of the feldspar deposits of the Eastern States, the principal object of the work being to ascertain the possible value of the feldspars as sources of potash.

A report on the "Tin resources of the Kings Mountain district, N. C. and S. C.," by Arthur Keith and D. B. Sterrett, submitted early in the spring by Mr. Keith for use in "preparedness" work, is now in course of publication as Bulletin 660–D. In May and the early part of June H. G. Ferguson made special reconnaissance examinations of some of the North Carolina deposits and of those in Virginia (Irish Creek district), with reference to the possibility of their utilization for war purposes. Mr. Ferguson has begun the preparation of brief reports of the results of his work for publication in the annual "Contributions to economic geology."

The text and maps for the folio to cover the Kings Mountain and Gaffney quadrangles, the larger part of which lies in South Carolina, have been completed and submitted by Mr. Sterrett.

A digest of the ground waters of the Coastal Plain of North Carolina, for the use of the War Department, was prepared by L. W. Stephenson.

A comprehensive monograph entitled "The systematic paleontology of the Cretaceous deposits of North Carolina," prepared in cooperation between this Survey and the North Carolina Geological

and Economic Survey, was transmitted to the State geologist for publication by the State Survey. This monograph included the following papers, some of which have been contributed by cooperating geologists and paleontologists:

General stratigraphic features of the Coastal Plain of North Carolina, by W. B. Clark.
Literature of the Cretaceous deposits of North Carolina, by L. W. Stephenson.
The faunas in their stratigraphic chronologic relations, by L. W. Stephenson.
The flora of the Black Creek formation, by E. W. Berry.
The correlation of the Cretaceous formations of North Carolina, by W. B. Clark.
Coelenterata, by L. W. Stephenson.
Echinodermata, by W. B. Clark.
Vermes, by L. W. Stephenson.
Mollusca, by L. W. Stephenson.
Arthropoda, by M. J. Rathbun.
Vertebrata (Reptilia), by C. W. Gilmore.
Plantae, by E. W. Berry.

A "Monograph of North American early Tertiary cheilostome Bryozoa," by F. Canu and R. S. Bassler, transmitted for publication, contains descriptions of the Eocene Bryozoa of the State.

A report on the Tertiary corals of the southeastern part of the United States, including North Carolina, by T. W. Vaughan, is in progress.

NORTH DAKOTA.

A general reconnaissance study of the glacial deposits in Divide and Williams counties and adjacent part of Burke, Mountrail, and McKenzie counties, N. Dak., was made by W. C. Alden in July, 1916. The literature of this and adjacent regions was studied in the office, and a preliminary description was prepared. When returning from a western trip in August, 1916, Frank Leverett made a brief examination of the glacial drift in the vicinity of Bismarck.

The manuscript for the Edgeley-Lamoure folio, prepared under agreement by H. A. Hard, was revised somewhat by W. C. Alden.

The invertebrate fauna of the Cannonball member of the Lance formation is under investigation by T. W. Stanton.

OHIO.

In the course of the investigations of reported indications of potash samples of brine were obtained from oil wells in Monroe and Noble counties, Ohio, by W. C. Phalen for chemical analysis, and a reported occurrence of nitrate near Ashtabula was visited twice by H. S. Gale, who was present at the boring of a 25-foot hole in this neighborhood.

A detailed report on the geology and mineral resources of the Woodsfield and Summerfield quadrangles by D. D. Condit and R. V. A. Mills has been submitted for critical review. Two reports on the

structure of the Berea sand, one (Bulletin 621–N) for the Summerfield quadrangle and the other (Bulletin 621–O) for the Woodsfield quadrangle, have been reprinted.

A report on the gas developments in and about Cleveland, by G. S. Rogers, has been issued as Bulletin 661–A.

The conditions of origin and deposition of the salts found in many wells and in pipe lines in the eastern portion of the State are the subject of a special investigation by R. V. A. Mills in association with R. C. Wells, of the division of chemistry and physics.

A folio describing the areal and economic geology of the Wellsville quadrangle and a bulletin on the structure and oil and gas resources of the quadrangle have been nearly completed, under agreement, by J. H. Hance. A folio text, covering the Steubenville and Cadiz quadrangles, by D. D. Condit, is ready for editing.

OKLAHOMA.

By courtesy of the Bureau of Mines a report by C. H. Beall, of that bureau, describing in detail the structure of the exposed rocks and of the individual oil sands, the relations of oil and gas to the structure, and the configuration of the salt-water surface in the Cushing field was cooperatively transmitted by Director Manning to the Geological Survey for publication. This paper, which is now in press, will appear as Bulletin 658.

The structure of the southern half of the Bristow quadrangle was examined in detail by A. E. Fath, and a report describing this area is now in preparation. A paper containing a description, with structure mapping, and a discussion of the oil and gas prospects of the north half of the same quadrangle is now in press as Bulletin 661–B.

Inspection of the general stratigraphy and criteria as to structure in Kingfisher County was made by Mr. Fath, who also examined and informally reported for the Office of Indian Affairs on a number of tracts of Indian land in the Iowa and Sac and Fox Indian reservations.

At the request of the superintendent of the Five Civilized Tribes and the Commissioner of Indian Affairs that the Survey furnish a geologist to make examinations of the structural conditions in certain Indian lands proposed for leasing, H. M. Robinson, associate geologist, was in March assigned to this duty.

During the summer of 1916 the structure of the northwest corner of the Pawhuska quadrangle, the areal geology of which had formerly been examined by C. D. Smith, who later resigned from the Survey, was mapped in detail by K. C. Heald, who during a part of the season was assisted by R. V. L. Stratton. A report on this area by Mr. Heald is in process of publication. Field work in the Pawhuska quadrangle was resumed in May by Mr. Heald, assisted by

K. C. Mather and, for the greater part of June, by D. E. Winchester and W. B. Emery, the investigation being carried on with the cooperation of the commissioner for the Osage Nation.

The structure and the oil and gas prospects in the Foraker quadrangle, in the Osage Nation, are described in a report by K. C. Heald, issued as Bulletin 641–B. This report has already been reprinted.

The structure of portions of the Hominy quadrangle was examined early in the winter by R. H. Wood, who in April resigned from the Survey with an agreement to complete at an early date his report on the structure and oil and gas prospects of the quadrangle. Information as to the structure in certain tracts of the Osage Nation offered for lease was furnished by Mr. Wood and Mr. Heald to the Office of Indian Affairs.

Data for the use of the Oklahoma Geological Survey in preparing a general geologic map of the State were cooperatively assembled under the supervision of Arthur Keith, chief of the section of eastern areal geology, who also furnished stratigraphic information to H. M. Robinson for his guidance in the land valuations for the Office of Indian Affairs.

Anticlines favorable for drill tests for oil and gas in Pontotoc County have been pointed out in a notice prepared by Mr. Robinson and distributed to the press by this Survey.

Examinations of the bituminous shales with sampling of coals were made by David White at a number of localities south of Muskogee and east of the Missouri, Kansas & Texas Railway, with the object of procuring additional criteria on which to base more definite conclusions as to the possible occurrence of oil in commercial amounts in the eastern part of the coal field and the southeastern part of the Paleozoic area of the State. Brief inspections were also made by Mr. White in the Bristow, Foraker, and Pawhuska quadrangles, in the Sac and Fox and Otoe Indian reservations, and at a number of points where drilling is now in progress in other parts of the State.

The two peneplains in western Arkansas were traced into the Lukfata quadrangle in the course of a reconnaissance by H. D. Miser.

Several deep wells in process of drilling were visited by R. K. Bailey, and arrangements were made for the collection of samples to be examined with reference to possible potash contents.

Collections of invertebrates from formations of Chester and Pottsville age were obtained by G. H. Girty, who also reported on other Carboniferous invertebrates from the State.

A report giving the results of a "Structural reconnaissance in the Okemah–Tiger Flats region, Okfuskee and Okmulgee counties," by A. E. Fath, has been submitted for publication in the "Contributions to economic geology." An anticlinal fold near Billings is mapped by Mr. Fath in Bulletin 641–E. The great demand for information

regarding oil prospects in Oklahoma has necessitated republication of this report and of the reports by C. H. Wegemann on the Healdton field (Bulletin 621–B) and on the Loco gas field, in Stephens and Jefferson counties (Bulletin 621–C).

OREGON.

A review of the nitrate prospects in southern Oregon, including the Sucker Creek claims, Buzzard Canyon, Stinking Lake, Rawhide, and Wagontire groups, was made by H. S. Gale.

A study of the chromite deposits of southwestern Oregon and an examination of the Great Gorge of the Columbia were carried on by J. S. Diller during a part of September.

Glacial deposits in the Cascade Mountains near Sisters, Oreg., were the subject of a reconnaissance by Frank Leverett.

PENNSYLVANIA.

The extramorainal glacial drift in parts of Lycoming, Clinton, Elk, and McKean counties was briefly studied by Frank Leverett in May.

The limestone formations of the Lebanon-Reading Valley, between the Mercersburg and Reading quadrangles, were mapped by G. W. Stose. A report giving the details of this examination is now in preparation by Mr. Stose.

The text and maps for the Fairfield-Gettysburg folio, by G. W. Stose and Florence Bascom, and for the Bellefonte folio, by Prof. E. S. Moore, have been completed and submitted for publication; and the text and maps for the Huntingdon and Hollidaysburg quadrangle have been revised by Charles Butts and the folio submitted.

A bulletin on the mineral resources of the Fairfield and Gettysburg quadrangles was prepared and submitted by Mr. Stose, and a report on the economic geology of the Allentown quadrangle, by B. L. Miller, is ready for editing.

The folio covering the Elkton and Wilmington quadrangles, by Florence Bascom and B. L. Miller, is in course of publication. These quadrangles also cover portions of Maryland and Delaware and were mapped in cooperation with the Maryland Geological Survey.

Some progress was made in field work in the McCalls Ferry and Quarryville quadrangles by E. F. Bliss and A. I. Jonas, and the text and maps for the Reading-Boyertown folio, by Florence Bascom, are nearly completed. In the Coatesville, West Chester, and Norristown quadrangles Miss Bascom was engaged in the further study of the various gneisses. Some reconnaissance work was done by Arthur Keith in southeastern Pennsylvania.

A general description of the bituminous coal fields of the State, with analyses and quantitative estimates of the coal resources in the beds and areas, by G. H. Ashley, is at an advanced stage of completion as a chapter of Professional Paper 100. A similar treatment of the anthracite fields and coals to go in the same volume is in preparation by Baird Halberstadt. Both papers are to be accompanied by maps.

Economic bulletins and folios covering the mineral resources and the general geology of the Punxsutawney, Curwensville, and Houtzdale quadrangles have been nearly completed by Mr. Ashley.

The detailed areal and structural examination of the Butler quadrangle was completed by G. B. Richardson and R. V. A. Mills, and the greater part of the Zelienople quadrangle was mapped in the season of 1916. The field studies of the Zelienople quadrangle were completed by Mr. Richardson in the spring of 1917, special attention being given to the composition and history of the waters locally found in the oil sands of the region. Mr. Richardson submitted in April an estimate of the petroleum resources remaining in the ground in western Pennsylvania.

The publication of the report on the geology of the Johnstown and Somerset quadrangles by Mr. Richardson has been delayed, pending the solution of certain problems concerning the correlations and formational boundaries as drawn in Maryland, southern Pennsylvania, and eastern Ohio. Paleontologic data on the Brush Creek coal and limestone and criteria for the determination of the Allegheny-Conemaugh boundary in the quadrangles above mentioned and in western Maryland were obtained in June, 1917, by Harvey Bassler, assisted by T. E. Williard.

The stratigraphy and fossils of the formations of central Pennsylvania were studied by E. O. Ulrich and Charles Butts in the valley region in June.

RHODE ISLAND.

The field examinations of the Cretaceous and Pleistocene deposits of the islands off the Rhode Island coast were completed by Prof. J. B. Woodworth, who, in accordance with an agreement, is engaged in the preparation of a report on the areal geology, history, and water resources of the Coastal Plain areas of southern New England.

SOUTH CAROLINA.

An investigation of the stratigraphy, structure, and ground waters of the Coastal Plain of South Carolina was begun by C. W. Cooke, who prepared, for the use of the War Department, a digest of available information on the ground waters of the State.

A "Monograph of North American early Tertiary cheilostome Bryozoa," by F. Canu and R. S. Bassler, transmitted for publication, contains descriptions of fossil Bryozoa from South Carolina.

The maps and manuscript for a folio on the Kings Mountain and Gaffney quadrangles, which include a small portion of North Carolina, have been completed by D. B. Sterrett and submitted for publication.

SOUTH DAKOTA.

An inspection of the structural criteria and of the gas developments in the Missouri Valley in the neighborhood of Pierre, S. Dak., was made late in the autumn by E. T. Hancock, with a view to determining whether geologic structure of types favorable for the occurrence of oil or gas was present or could be recognized if present.

A report describing and mapping the lignite field of northwestern South Dakota, by D. E. Winchester, C. J. Hares, E. R. Lloyd, and E. M. Parks, has been published as Bulletin 627.

TENNESSEE.

Field and office work for a report on the marbles of Tennessee, to be incorporated in a general report on the marbles of the Southern States, was carried on by T. N. Dale.

Greensands in McNairy County, in western Tennessee, were sampled by G. H. Ashley for the purpose of obtaining more authentic information as to their value as sources of potash. The results are given in Bulletin 660–B.

The preparation of the folio covering the Waynesboro quadrangle, by H. D. Miser, has advanced somewhat, but on account of the demands on Mr. Miser's time for the preparation of reports on the geology and mineral resources of portions of Arkansas, this folio is not yet completed.

At the request of the State geologist of Tennessee, A. H. Purdue, arrangements were made for the transfer of Mr. Miser's office work to Nashville during June, in order that he might attend to the duties of the State geologist during Mr. Purdue's enforced absence for a time on account of his health.

The text and maps for a report on the coal resources of the Crossville quadrangle were revised by Charles Butts, who has submitted a short paper on the coals between Clifty and Bon Air that has been issued as Bulletin 641–K.

A comprehensive report on the Ducktown district awaits portions of the description of the general geology, by Arthur Keith and F. B. Laney.

TEXAS.

Drilling at Cliffside, Tex., for the purpose of procuring adequate information as to the reported presence of potash in the region west of Amarillo was resumed as soon as the necessary equipment and crew could be obtained. This well, which had reached a depth of about 360 feet before work had been suspended the preceding year on account of exhaustion of funds, has now reached a depth of 1,657 feet. No potash in notable amount has yet been found there.

The sulphur deposits of eastern Texas were examined by P. S. Smith with special reference to the question of drawing on them as sources of raw material for the manufacture of sulphuric acid.

Digests of the ground waters of the Coastal Plain of Texas, for the use of the War Department, were prepared by C. W. Cooke and T. W. Vaughan. A report on the ground waters of the Coastal Plain of Texas west of Brazos River, by Alexander Deussen, is in progress. A preliminary report on the stratigraphy, structure, and correlation of the Cretaceous deposits of northeastern Texas, by L. W. Stephenson, is nearly complete.

The Catahoula formation is discussed by G. C. Matson in a paper entitled "The Catahoula sandstone," and by Prof. E. W. Berry in a paper entitled "The flora of the Catahoula sandstone," both in Professional Paper 98–M, and the Citronelle formation is discussed by Mr. Matson in a paper on "The Pliocene Citronelle formation of the Gulf Coastal Plain" (Professional Paper 98–L).

A monograph entitled "Later Eocene fossil plants of southeastern North America," by E. W. Berry, transmitted for publication, contains descriptions of fossil plants from Texas, and a "Monograph of North American early Tertiary cheilostome Bryozoa," by F. Canu and R. S. Bassler, also transmitted for publication, gives accounts of fossil Bryozoa from the State.

Examinations of oil indications reported as present at a number of points in the Coastal Plain region of Texas were made by O. B. Hopkins, who paid special attention to the domes near Brenham and Palestine and has described these domes in a paper now in press as Bulletin 661–G. A report on the geologic structure and conditions of oil distribution in the Corsicana-Powell district, by G. C. Matson and O. B. Hopkins, is nearly ready to be issued as Bulletin 661–F.

Late in the spring of 1917 a somewhat exhaustive study of the salt domes of the Coastal Plain of the State, with special reference to the origin and conditions of occurrence of the salt, sulphur, oil, and gas in the domes, was begun by G. S. Rogers.

A second edition of Bulletin 629, "Natural-gas resources of parts of north Texas," by E. W. Shaw and G. C. Matson, has been issued and exhausted.

Large collections of early Paleozoic invertebrates, submitted by the Texas Bureau of Economic Geology and Technology, under the direction of J. A. Udden, were studied by E. O. Ulrich.

UTAH.

The Little Cottonwood and American Fork districts, Utah, were examined during the field season of 1916 by B. S. Butler, assisted by F. F. Hintze, and will be the subjects of a detailed report. A comprehensive report on the ore deposits of Utah by Mr. Butler and G. F. Loughlin is in preparation. A report on zinc carbonate and related copper carbonate ores at Ophir, by G. F. Loughlin, is to be published as Bulletin 690–A.

Reported deposits of molybdenum ore in the vicinity of Ouray were examined by F. L. Hess in May, 1917.

Two reports describing the location and conditions of occurrence of phosphate in the Logan quadrangle have been completed and transmitted by E. H. Finch.

Examinations for the recovery of potash at several points in the region of Salt Lake City were made by H. S. Gale. The report giving the potash content of some Utah copper ores (Bulletin 620–J) has been reprinted.

The oil shales in the Green River formation of the Uinta Basin were traced westward from Dragon by D. E. Winchester, who demonstrated the presence of a large body of productive shale in the western portion of the basin. The results of the work are given in a paper on "Oil shale in the Uinta Basin, Utah," now ready for publication as a part of Bulletin 691. Mr. Winchester also examined and sampled the oil shales at Ephraim and at several other points in the State.

A second issue of Bulletin 641–A, "Ozokerite in central Utah," by H. M. Robinson, has been necessary.

Cambrian and Devonian invertebrates from the Wasatch Range were studied by Edwin Kirk. Reports were made on Carboniferous invertebrates from a number of localities by G. H. Girty, and on fossil plants by F. H. Knowlton.

A description of the Lost Creek coal field, in Morgan County, by F. R. Clark, is ready for editing.

VERMONT.

The areal survey of the Bennington quadrangle was continued by L. M. Prindle. This quadrangle, combined with the Hoosic quadrangle (New York), will be covered by a folio, for which the text and maps are nearly completed.

The pre-Cambrian granites and gneisses and their structure in the Rutland, Wallingford, and Castleton quadrangles were further

studied and mapped in detail by Arthur Keith, who gave special attention also to the deformed shore lines in these quadrangles. A paper on these shore lines was given by him at the Albany meeting of the Geological Society of America.

VIRGINIA.

In order to ascertain more fully the physiographic and stratigraphic conditions under which the manganese deposits of the valley region of Virginia were laid down and later to test the applicability of the tentative hypothesis previously adopted by D. F. Hewett to the discovery of new ore bodies, the central part of the valley, including several mines, was in June visited by Arthur Keith, Dr. T. L. Watson, State geologist, M. R. Campbell, D. F. Hewett, G. W. Stose, Laurence LaForge, F. J. Katz, and J. B. Umpleby and a trial made. The examination and description of the manganese mines and prospects of the State is nearly completed by Dr. Watson, and the results of the Virginia manganese investigations will be published under cooperative auspices.

The tin deposits in the Irish Creek district were studied by H. G. Ferguson in the spring of 1917, and a report giving the results is in preparation.

An experimental plant near Yorktown for the extraction of potash from greensand was early in June inspected by H. S. Gale, A. C. Spencer, and W. B. Hicks, in company with H. M. Ami, of the British Embassy, for the purpose of viewing a working test of the plant.

The areal mapping of the coal field in the western part of the State and of Buchanan County in particular was continued cooperatively by Henry Hinds, of this Survey, assisted by T. K. Harnsberger for the State. A report on the geology and coal resources of Buchanan County is nearly completed, the geologic map being ready for transmission to the State for publication. A report on Carboniferous invertebrates was made by G. H. Girty.

A chapter on the Coastal Plain of Virginia, to form a part of a geographic manual on the northern Middle Atlantic States, was prepared by L. W. Stephenson.

A digest of the ground waters of the Coastal Plain of Virginia, for the use of the War Department, was prepared by L. W. Stephenson.

WASHINGTON.

A description of the geographic features of the Mount Rainier National Park and their origin has been revised by F. E. Matthes for publication on the back of the topographic map covering the park.

Glacial deposits near Spokane, Puget Sound, and Mount Rainier were studied for a few days by Frank Leverett.

A report covering a "Reconnaissance of the Conconully and Ruby mining districts, Wash.," by E. L. Jones, has been issued as Bulletin 640–B.

Invertebrate fossils from the Tertiary formations of the western part of the State are under investigation by W. H. Dall.

WEST VIRGINIA.

In the search for a very pure glass sand such as is needed for the manufacture of optical instruments to be used by the Army and Navy, the sandstone deposits in the vicinity of Berkeley Springs were examined by R. W. Stone in company with H. S. Washington, who represented the Carnegie Geophysical Laboratory.

Office work on the maps and description of the Williamsport quadrangle, which includes parts of Maryland and Pennsylvania, has been advanced by G. W. Stose. This material will form part of the Williamsport-Hagerstown folio, and the work is being done in cooperation with the State of Maryland.

WISCONSIN.

The text and maps for a folio covering the Wausau and Marathon quadrangles, studied in cooperation with the State Geological and Natural History Survey, have been completed by Samuel Weidman and the folio submitted for publication.

A report on the glacial moraines and shore lines of the Lake Superior region, by Frank Leverett, is nearing completion. In connection with the preparation of this paper some field work was done in October and a field conference was had by Mr. Leverett with Dr. Weidman. "The Quaternary geology of southeastern Wisconsin," by W. C. Alden (Professional Paper 106), is now in press.

Early Paleozoic formations in parts of the State were studied by E. O. Ulrich in cooperation with State Geologist Hotchkiss for the purpose of ascertaining the equivalents of some of the Wisconsin geologic formations as compared with those of New York, Alabama, and other areas.

WYOMING.

At the request of the National Museum lithologic collections were made in the Leucite Hills, Wyo., by E. S. Larsen.

The report on the geologic structure and oil resources of the southern portion of the Big Horn Basin, by D. F. Hewett and C. T. Lupton, has been revised and brought up to date, following further field examinations made by Mr. Hewett in October, and the report is now in press as Bulletin 656.

A report on the structure and oil prospects of the Elk Basin was prepared and submitted for publication by C. J. Hares, and a report covering the Salt Creek district, by C. H. Wegemann, has been submitted and is now in process of publication as Bulletin 670. "Anticlines in central Wyoming," by C. J. Hares, has been published and reprinted as Bulletin 641–I.

Cretaceous invertebrates from the Big Horn Basin and from eastern Wyoming were reported on by T. W. Stanton, and Mesozoic invertebrates from Carbon County were identified by J. B. Reeside, jr.

A comprehensive study of American Jurassic ammonites belonging to the family Cardioceratidae, mostly from Wyoming, was made and the first draft of a paper on them was prepared by J. B. Reeside, jr.

Carboniferous invertebrates were reported on by G. H. Girty, and the study and description of the fauna of the Big Horn limestone were continued by Edwin Kirk.

The stratigraphy of the Wind River Mountains is the subject of a paper by Eliot Blackwelder, now ready for publication as a bulletin.

A report on the "Relations of the Embar and Chugwater formations in central Wyoming," by D. D. Condit, was published as Professional Paper 98–O, and a paper by C. H. Wegemann on "Wasatch fossils in so-called Fort Union beds in the Powder River basin, Wyo.," has been issued as Professional Paper 108–D.

The gypsum deposits in the southern part of the Big Horn Mountains are described by C. T. Lupton and D. D. Condit in Bulletin 640–H.

CANAL ZONE AND WEST INDIES.

The following monographs prepared in compliance with an agreement made in 1912 between the Canal Commission, the United States Geological Survey, and the Smithsonian Institution have been transmitted to the Secretary of the Smithsonian Institution for publication:

Introduction to Contributions to the geology and paleontology of the Canal Zone, Panama, and geologically related areas in Central America and the West Indies, by T. W. Vaughan.

On some fossil and recent Lithothamnieae of the Panama Canal Zone, by M. A. Howe, with plates 1–11.

The fossil higher plants from the Panama Canal Zone, by E. W. Berry, with plates 12–18.

The smaller fossil Foraminifera of the Panama Canal Zone, by J. A. Cushman, with plates 19–33.

The larger fossil Foraminifera of the Panama Canal Zone, by J. A. Cushman, with plates 34–45.

Fossil Echini of the Panama Canal Zone and Costa Rica, by R. T. Jackson, with plates 46–52 and text figures 1–3.

Fossil Bryozoa of the Panama Canal Zone and Costa Rica, by F. Canu and R. S. Bassler, with plate 53.

Crustacea and Decapoda from the Panaman region, by M. J. Rathbun, with plates 54–66.

Cirripedia from the Panama Canal Zone, by H. A. Pilsbry, with plate 67.

The following papers also are nearly ready for transmission:

Fossil Madreporaria from Panama and geologically related areas in Central America and the West Indies, with about 70 plates, by T. W. Vaughan.

The stratigraphic relations and biologic character of the serimentary formations of the Panama Canal Zone and geologically related areas in Central America, by T. W. Vaughan and D. F. MacDonald, with two maps and several text figures.

Correlation of the sedimentary geologic formations of Panama in their relation to the geologic history of Central America and the West Indies, by T. W. Vaughan.

Prior to his resignation from the United States Geological Survey, D. F. MacDonald completed an extensive monograph on the physiography, stratigraphy, geologic history, and economic geology of the Canal Zone. This paper will be submitted to the Smithsonian Institution for publication as soon as information procured through the paleontologic investigations can be incorporated in it.

As paleontologic studies collateral to those of the Tertiary formations of the southeastern United States and the Canal Zone, J. A. Cushman has monographically described collections of fossil Foraminifera from the Leeward Islands, the Dominican Republic, and Jamaica and nearly finished a similar account of collections from Cuba. T. W. Vaughan has nearly finished a general monograph of the fossil corals of the West Indies; all material in the United States National Museum, except a few species from the islands of Antigua and Anguilla, has been described and figured.

Other similar faunal monographs for the West Indies, mostly by specialists not connected with the Survey, are either complete or almost complete. These careful, comprehensive investigations of the stratigraphic paleontology of the West Indies furnish a basis for accurate stratigraphic work in that area. As the United States has so many interests in the West Indies, the results obtained through the investigations mentioned are of particular importance.

DIVISION OF ALASKAN MINERAL RESOURCES.

APPROPRIATION AND CLASSES OF WORK.

Under the appropriation of $100,000 made for the continuation of the investigation of the mineral resources of Alaska, as in previous years, work of the following classes was carried on: Reconnaissance and detailed geologic surveys, special investigations of mineral

resources, reconnaissance and detailed topographic surveys, investigations of water resources, and collection of statistics of mineral production.

PERSONNEL.

On July 1, 1916, the personnel of the division consisted of 1 geologist in charge, 11 geologists, 4 topographic engineers, 1 hydraulic engineer, 3 clerks, and 1 draftsman on annual salaries, 1 field assistant, and 31 camp hands and recorders. On June 30, 1917, the personnel included 1 acting geologist in charge, 9 geologists, 1 topographic engineer, 1 hydraulic engineer, 3 clerks, and 1 draftsman on annual salaries, and 1 clerk on per diem salary. The field force also included 6 camp hands and recorders.

The following members of the division of Alaskan mineral resources received commissions on or prior to June 30, 1917:

Alfred H. Brooks, major, Engineer Officers' Reserve Corps.
J. W. Bagley, captain, Engineer Officers' Reserve Corps.
E. M. Aten, captain, Quartermaster's Department.
C. E. Giffin, captain, Engineer Officers' Reserve Corps.

FIELD WORK DURING THE SEASON OF 1916.

Areas covered and allotments.—Twelve parties were engaged during 1916 in Alaska surveys and investigations. Of these parties seven were engaged in geologic surveys, three in topographic surveys, one was a combined topographic and geologic party, and one was engaged in stream gaging. The areas covered by geologic reconnaissance surveys on a scale of 1:250,000 (4 miles to an inch) amount to 5,100 square miles; by detailed geologic surveys on a scale of 1:62,500 (1 mile to an inch), 636 square miles. The results of investigation of special problems relating to mineral occurrence can not be expressed areally. About 9,700 square miles of topographic reconnaissance surveys on a scale of 1:250,000 (4 miles to the inch) and 65 square miles on a scale of 1:62,500 (1 mile to an inch) were made. In cooperation with the Forest Service, stream gaging in southeastern Alaska was also continued.

With increased knowledge of Alaska's geology and the new facts made available by mining operations, it has become necessary to revise some of the previous interpretations of the geology, especially those made before accurate base maps were available. Therefore, the revision of some of the mapping of the earlier years becomes of vital importance, and to this work some time is devoted each year. In 1917 an area of 36 square miles adjacent to Juneau, previously surveyed geologically on a scale of 1:62,500, was mapped on the larger scale of 1:24,000. The geologic mapping of about 1,500 square miles on a scale of 1:250,000 was also revised.

To state the work geographically, four parties worked in southeastern Alaska, one in the Copper River region, two on Prince William Sound, and four in the Yukon basin, and one was engaged in general investigations in the Yukon basin and Seward Peninsula. Among the important results of the year were the completion of the detailed topographic and geologic survey of Juneau and vicinity, the completion of the reconnaissance geologic survey of the southern part of the Ketchikan district, and the detailed survey of a part of the Nenana coal field.

The following tables show the allotments, including both field and office work, of the total appropriation of $100,000 for the fiscal year 1916 to the regions investigated. In addition to this a balance of about $6,000 from last year's appropriation was expended in equipping parties for the season's field work. General office expenses are apportioned to the several allotments. Salaries of the permanent staff are included up to the close of the fiscal year 1917, but expenses other than these include only the cost of field and office work during 1916. The "general investigations" include, among other things, the cost of collecting mineral statistics and of office work relating to the field investigations of previous seasons. A balance of about $6,000 has been utilized for equipping field parties in 1917.

Approximate geographic distribution of appropriation for Alaska investigations, 1916–17.

Southeastern Alaska	$22,500
Copper River	7,000
Prince William Sound	14,500
Yukon basin	42,500
Seward Peninsula	1,000
General investigations	6,500
Allotted to field work, 1917	6,000
	100,000

Approximate allotments to different kinds of surveys and investigations, 1916–17.

Geologic reconnaissance surveys	$15,000
Detailed geologic surveys	20,000
Special geologic investigations	11,600
Reconnaissance topographic surveys	19,000
Detailed topographic surveys	4,500
Water resource investigations	4,900
Collection of mineral statistics	1,600
Miscellaneous, including administration, inspection, clerical salaries, office supplies and equipment, and map compilation	17,400
Allotted to field work, 1917	6,000
	100,000

Allotments for salaries and field expenses, 1916–17.

Scientific and technical salaries	$39,843
Field expenses	37,615
Clerical and office salaries	16,542
Allotted to field work, 1917	6,000
	100,000

The following table exhibits the progress of investigations in Alaska and the annual grant of funds since systematic surveys were begun in 1898. It should be noted that a varying amount is spent each year on special investigations that yield results which can not be expressed in terms of area.

Progress of surveys in Alaska, 1898–1916.

Year.	Appropriation.	Areas covered by geologic surveys.			Areas covered by topographic surveys.[a]					Investigations of water resources (gaging stations maintained part of year).
		Exploratory (scale 1:625,000 or 1:1,000,000).	Reconnaissance (scale 1:250,000).	Detailed (scale 1:62,500).	Exploratory (scale 1:625,000 or 1:1,000,000).	Reconnaissance (scale 1:250,000; 200-foot contours).	Detailed (scale 1:62,500 and larger; 25, 50, or 100 foot contours).	Lines of levels.	Bench marks set.	
		Sq. m.	*Sq. m.*	*Sq. m.*	*Sq. m.*	*Sq. m.*	*Sq. m.*	*Miles.*		
1898	$46,189	9,500	.....	.....	12,840	2,070	.....	.....	.....	.....
1899	25,000	6,000	.....	.....	8,690	.....	.....	.....	.....	.....
1900	60,000	3,300	6,700	.....	630	11,150	.....	.....	.....	.....
1901	60,000	6,200	5,800	.....	10,200	5,450	.....	.....	.....	.....
1902	60,000	6,950	10,050	.....	8,330	11,970	96	.....	.....	.....
1903	60,000	5,000	8,000	96	.....	15,000	.....	.....	.....	.....
1904	60,000	4,050	3,500	.....	800	6,480	480	86	19	.....
1905	80,000	4,000	4,100	536	.....	4,880	787	202	28	.....
1906	80,000	5,000	4,000	421	.....	13,500	40	.....	.....	14
1907	80,000	2,600	1,400	442	.....	6,120	501	95	16	48
1908	80,000	2,000	2,850	604	.....	3,980	427	76	9	53
1909	90,000	6,100	5,500	450	6,190	5,170	444	.....	.....	81
1910	90,000	.....	8,635	321	.....	13,815	36	.....	.....	69
1911	100,000	8,000	10,550	496	.....	14,460	246	.....	.....	68
1912	90,000	.....	2,000	525	.....	.....	298	.....	.....	69
1913	100,000	3,500	2,950	180	3,400	2,535	287	.....	.....	.....
1914	100,000	1,000	7,700	325	600	10,300	10	.....	.....	.....
1915	100,000	.....	10,700	200	.....	10,400	12	3	2	9
1916	100,000	.....	5,100	636	.....	9,700	67	.....	.....	20
	1,461,189	73,200	99,535	5,232	51,680	146,980	3,731	453	74	.....
Percentage of total area of Alaska	.....	12.48	16.80	0.89	8.81	25.05	0.64	.....	.....	.....

[a] The Coast and Geodetic Survey, International Boundary Survey, and General Land Office have also made topographic surveys in Alaska. The areas covered by these surveys are, of course, not included in these totals.

General work.—Alfred H. Brooks, geologist in charge, was engaged in office work until July 24, when he started for Alaska. He joined Mr. Chapin at Ketchikan on August 2 and devoted the next two weeks to the study of the geology of the Ketchikan district. The time from August 19 to 26 was spent in the Juneau district with Mr. Spencer and Mr. Eakin. Here a conference was also had with

Mr. Canfield. A study of the geology of the Latouche district of Prince William Sound was made in company with Mr. Johnson from August 30 to September 10. A brief visit was then made to Anchorage, and several more days were spent at Juneau on the return trip. Seattle was reached on September 24.

In the office Mr. Brooks devoted 56 days to geologic studies, 24 days to the critical reading and revision of manuscripts, 13 days to the writing of the progress report, 10 days to field plans, 8 days to mineral statistics, 5 days to proof reading, and 4 days to preparation of the annual press bulletin on mining in Alaska. Mr. Brooks was absent from the office the month of June and part of May, and during this time G. C. Martin was engaged chiefly in executive work as acting geologist in charge of the division.

R. H. Sargent continued the general supervision of the Alaska topographic surveys and map compilation, in addition to carrying on his own field work, until May 26, when he went to Peking on furlough to act as professor of surveying triangulation in the Government Institute of Military Survey of China. Mr. Sargent's administrative duties were then assigned to Mr. Bagley and Mr. Witherspoon.

During the last six years J. W. Bagley has been investigating the use of photographic methods in Alaska topographic surveys. In this work he has devised both methods and instruments, whose utility has been proved by actual use. During 1916 he prepared a report on the results of this work, which has been published as Bulletin 657.

Arthur Hollick was employed for one month in writing the description of the Cretaceous and Tertiary floras of Alaska.

E. M. Aten continued as office assistant to the geologist in charge and supervised the office work during Mr. Brooks's absence in the field. He also continued to assist in collecting statistics of production of precious metals in Alaska.

Southeastern Alaska.—The geologic reconnaissance survey of the southern half of the Ketchikan district, begun in 1913 and continued in 1915, was completed in 1916. These investigations were made by Theodore Chapin, who devoted the time between May 20 and September 20 to the work. In addition to revising the previous geologic map an area of some 500 square miles was surveyed on a reconnaissance scale. Considerable time was also devoted to a study of the ore deposits and an investigation of mining developments.

The making of a detailed base map of the region adjacent to Juneau, which was begun in 1914, was completed in 1916. The large scale adopted, 1:24,000 (2.64 inches to the mile), and the ruggedness of the region, together with heavy timber and adverse climatic conditions, have made this survey exceedingly difficult and expensive.

The area covered is 36 square miles, of which 12½ square miles was surveyed in 1916. Owing to the high cost of the survey it has been necessary to confine it to those areas which are of greatest present economic importance. D. C. Witherspoon, who did this work, was engaged in field work from May 29 to September 27, inclusive.

The area covered by the base map above referred to was surveyed geologically during 1916 by A. C. Spencer and H. M. Eakin, who also made a detailed investigation of the ore deposits. Field work was begun on July 11 and continued until October 6, covering an area of 36 square miles. Mr. Eakin also devoted about three weeks to a study of the Porcupine placer district. This district had not been investigated by a geologist since 1903, during which time some developments had been made. Mr. Eakin also devoted about a week to collecting data on mining developments in the more isolated parts of the Juneau district.

The investigation of the water resources of southeastern Alaska, begun in 1915 under a cooperative agreement with the Forest Service, was continued throughout 1916. G. H. Canfield, who had charge of this work, maintained 8 automatic gages throughout the year. In addition, 12 other gages were installed in cooperation with various individuals and corporations. This work could not have been carried on without the cordial cooperation of the Forest Service. Many members of that service have given substantial aid, but particular acknowledgment should be made to W. G. Weigle, special agent at Ketchikan, and to Leonard Lundgren, district engineer at Portland, Oreg.

Copper River region.—Though much the larger part of the Chitina basin has been covered by geologic surveys, there are still many unsolved problems relating to the stratigraphy, structure, and ore deposits. These can be solved only by a more or less intensive study of special areas, and to this task F. H. Moffit was assigned. He devoted the time from June 23 to September 29 to this work. In addition to making a special study he also made geologic reconnaissance surveys of about 300 square miles.

Prince William Sound.—The rapid development of mining in the Prince William Sound region has made a demand for further surveys and investigations. During 1916 B. L. Johnson made a somewhat detailed survey of the Latouche district, in which he covered an area of about 400 square miles. In addition to this he made some investigations of the mining developments in other parts of the Prince William Sound region. Mr. Johnson devoted the time from June 11 to October 18 to this work.

J. W. Bagley began topographic reconnaissance surveys in the Port Wells district of the Prince William Sound region on June 8 and extended these surveys eastward, continuing his field work until Sep-

tember 12. He covered an area of 1,900 square miles on a scale of 1:250,000, using photographic methods. In addition he surveyed in detail (scale 1:62,500) an area of 65 square miles lying adjacent to Jack Bay, this work connecting the previously mapped areas of the Ellamar and Port Valdez districts.

Yukon basin.—G. C. Martin, assisted by A. G. Maddren and R. M. Overbeck, made a detailed geologic study of the western part of the Nenana coal field. The base map was provided for this work by the surveys made by the General Land Office. The field work was begun on June 16 and continued to August 24, and the total area surveyed was 236 square miles on a scale of 1:62,500.

S. R. Capps and C. E. Giffin were charged with the duty of making a reconnaissance survey of the Kantishna placer district. The surveys were begun on Nenana River and extended westward to include the Kantishna district and southward to the crest line of the Alaska Range. Mr. Capps, who had charge of the geologic investigations, began work on June 26 and continued until August 25, surveying an area of about 1,000 square miles on a scale of 1:250,000. He also revised previous geologic mapping over an area of about 2,000 square miles. Mr. Giffin, who made the topographic survey, began field work on June 26 and completed it on August 29. He covered an area of 4,500 square miles, using photographic methods.

The important developments in the Tolovana district led to an investigation of this field during 1916. J. B. Mertie, jr., was detailed for this work and began field work in the Tolovana district on July 7, continuing until August 4. Besides studying the placers he made a geologic reconnaissance map of about 240 square miles. The time from August 8 to 31 was devoted by Mr. Mertie to an investigation of the ore deposits of the Fairbanks district. In this field he devoted special attention to the occurrence of tungsten.

Important mining developments in the Marshall district of the lower Yukon have made an urgent demand for a survey of this field. Therefore a combined geologic and topographic party under the direction of R. H. Sargent, with G. L. Harrington as geologist, was assigned to this field. This party began work on June 16 and continued until September 6. The topographic and geologic surveys cover an area of some 3,300 square miles.

Seward Peninsula.—J. B. Mertie, jr., was detailed to make a supplementary investigation of the lodes in the Nome and other districts of Seward Peninsula. He devoted the time from September 19 to October 13 to this work and paid special heed to the tungsten and antimony deposits. In addition he collected data on mining developments.

FIELD WORK FOR THE SEASON OF 1917.

Field work was begun before the end of the fiscal year (during June) by four parties, as indicated below. S. R. Capps began the investigation of the mineral resources of the region tributary to that part of the Government railroad under construction, lying between Anchorage and Broad Pass, except the Matanuska coal field and the Yentna placer district. G. L. Harrington began the examination of the reported occurrences of platinum in the Tolstoi region of the Innoko district, the Dime Creek region of the Koyuk district, and the Bear Creek region of the Fairhaven district. A. G. Maddren started for southwestern Alaska to investigate the sulphur deposits on Unalaska Island and the beach placers near Red River, on the west shore of Kodiak Island, which are reported to carry platinum. Time permitting, he will also investigate the recent lode mining developments on Unga Island and the occurrence of sulphur on Makushin Volcano. D. C. Witherspoon began a topographic reconnaissance survey (scale, 1:250,000) of the region adjacent to or accessible from tidewater of that part of Prince William Sound extending from Point Whitehead, south of Cordova, northward to the Ellamar district. G. H. Canfield from January throughout the year has continued the investigation of the water powers of southeastern Alaska in cooperation with the Forest Service. All these surveys and investigations will continue into the fiscal year 1917–18.

COLLECTION OF STATISTICS.

The collection of the statistics of production of precious metals in Alaska, begun by the Alaska division in 1905, was continued as usual. Preliminary estimates of mineral production for 1916 were published on January 1, 1917. The progress report for 1916 (Bulletin 662–A), containing the full statement and tables on mineral production, was transmitted on May 5, 1917.

PUBLICATIONS.

During the year the Survey published six bulletins (Nos. 630, 631, 642, 649, 657, and 666–P) and one water-supply paper (No. 382) relating to Alaska. Two topographic maps (Pl. I, Bulletin 630, and Pl. I, Bulletin 631) were published during the year.

Three bulletins (Nos. 655, 662, and 666–P), one water-supply paper (No. 418), and three topographic maps (lower Matanuska Valley, by R. H. Sargent, scale 1:62,500, contour interval 50 feet; Juneau and vicinity, by D. C. Witherspoon, scale 1:24,000, contour interval 50 feet; and Lake Clark-central Kuskokwim, by R. H. Sargent, scale 1:250,000, contour interval 200 feet) were in press at the end of the year.

Manuscripts of the following reports are completed:

The Canning River region, northern Alaska, by E. de K. Leffingwell (Professional Paper 109).

The Cosna-Nowitna region, Alaska, by H. M. Eakin (Bulletin 667).

The Nelchina-Susitna region, Alaska, by Theodore Chapin (Bulletin 668).

The upper Chitina Valley, Alaska, by F. H. Moffit (Bulletin 675).

The marble resources of southeastern Alaska, by E. F. Burchard.

The Kantishna region, Alaska, by S. R. Capps.

The Anvik-Andreafski region, including the Marshall district, Alaska, by G. L. Harrington.

The following reports are in hand:

The lower Kuskokwim region, by A. G. Maddren.

The Kotsina-Kuskulana district, by F. H. Moffit.

The upper Matanuska basin, by G. C. Martin.

Geology of the Glacier Bay and Lituya region, Alaska, by F. E. Wright and C. W. Wright.

Geology of the region along the international boundary from Porcupine River to the Arctic Ocean, by A. G. Maddren.

The Yakataga district, by A. G. Maddren.

The Mesozoic stratigraphy of Alaska, by G. C. Martin.

The Valdez district, by B. L. Johnson.

The Ruby-Kuskokwim region, by J. B. Mertie, jr., and G. L. Harrington.

The Cretaceous and Tertiary floras of Alaska, by Arthur Hollick.

The Nenana coal field, by G. C. Martin.

The Porcupine district, by H. M. Eakin.

The Ketchikan district, by Theodore Chapin.

The structure and stratigraphy of Gravina and Revillagigedo islands, by Theodore Chapin.

The geology of Latouche Island, by B. L. Johnson.

Office work on the 12 maps listed below has been completed:

Kotsina-Kuskulana district, by D. C. Withersoon; scale, 1:62,500; contour interval, 100 feet.

Nelchina-Susitna region, by J. W. Bagley; scale, 1:250,000; contour interval, 200 feet.

Juneau and vicinity, by D. C. Witherspoon; scale, 1:24,000; contour interval, 50 feet.

Lower Kuskokwim region, by A. G. Maddren; scale, 1:500,000; contour interval, 400 feet.

Cosna-Nowitna region, by H. M. Eakin; scale, 1:250,000; contour interval, 200 feet.

Ruby district, by C. E. Giffin and R. H. Sargent; scale, 1:250,000; contour interval, 200 feet.

Lower Yukon region, by R. H. Sargent; scale, 1:250,000; contour interval, 100 feet.

Marshall district, by R. H. Sargent; scale, 1:250,000; contour interval, 100 feet.

Canning River region, by E. de K. Leffingwell; scale, 1:250,000; sketch contours.

North Arctic coast, by E. de K. Leffingwell; scale, 1:500,000; no contours.

Martin Point to Challenge Entrance, by E. de K. Leffingwell; scale 1:125,000; no fixed contour interval.

Challenge Entrance to Thetis Island, by E. de K. Leffingwell; scale, 1:125,000; no fixed contour interval.

The following topographic maps are in hand:

Innoko-Iditarod region, by R. H. Sargent and C. E. Giffin; scale, 1:250,000; contour interval, 200 feet.

Anchorage-Matanuska region, by R. H. Sargent and others; scale, 1:250,000; contour interval, 200 feet. (This includes maps of the "Matanuska region" and "Turnagain-Knik region," which were previously reported separately.)

Yukon-Tanana Valley; compiled; scale, 1:500,000; contour interval, 400 feet.

Glacier Bay region; compiled; scale, 1:250,000; contour interval, 200 feet.

Kantishna region, by C. E. Giffin; scale, 1:250,000; contour interval, 200 feet.

Port Wells region, by J. W. Bagley; scale, 1:250,000; contour interval, 200 feet.

Jack Bay district, by J. W. Bagley; scale, 1:62,500; contour interval, 50 feet.

Upper Chitina Valley, by F. H. Moffit; scale, 1:250,000; contour interval, 200 feet.

SCIENTIFIC RESULTS.

Each of the geologists who has been at work in Alaska during the year has, as in previous years, added greatly to the volume of knowledge concerning the geology of that Territory. It is not possible to enumerate here all the important discoveries that have been made, but those of widest interest or of most far-reaching importance will be mentioned.

In southeastern Alaska Upper Triassic fossils were discovered by A. C. Spencer and H. M. Eakin in a series of slates and andesites of the Juneau district. This not only adds a new Triassic locality to those previously known in Alaska but gives new and very important evidence concerning the age of the metamorphic rocks of this district. This does not mean, however, that the slates of southeastern Alaska are all Triassic, for there has also been a new discovery, by Theodore Chapin, of Jurassic or Cretaceous fossils in the slate and graywacke of Gravina Island, which have previously been tentatively assigned by some to the Triassic and by others to the Paleozoic. Mr. Chapin has also determined that the structure of the Ketchikan district is that of a syncline overturned toward the southwest and has discovered important lower Carboniferous fossil localities on the west coast of Prince of Wales Island. Mr. Eakin determined that both the original and the secondary structural features in the Funter Bay district dip at low angles. This structure has, apparently, an important influence on the ore deposits, as it caused the ore-bearing solutions to form large fissure veins instead of the more diffused stockworks of the areas of nearly vertical dip. Valuable information concerning the extent of the Quaternary submergence was obtained by A. C. Spencer and H. M. Eakin, who found marine fossils and beach lines at an elevation of 600 feet in the vicinity of Juneau—nearly twice as high as they had previously been known at this locality—and by Theodore Chapin, who found marine fossils at an elevation of 80 feet on Gravina Island. Mr. Eakin found evidence in the Porcupine district of two

distinct ice advances, each followed by intrenchment of hanging valleys and by concentration of placer gold deposits.

The investigation of the copper deposits of Prince William Sound by B. L. Johnson revealed the fact that chalmersite ($CuFe_2S_3$), a mineral previously known only as small crystals from South America and not as an ore, occurs as an abundant constituent of the copper ores at several of the prospects on Knight Island.

In the Copper River region F. H. Moffit obtained collections of fossils which seem to indicate that the Kennicott formation may be Cretaceous instead of Upper Jurassic, as has been hitherto supposed.

In the Yukon Valley J. B. Mertie, jr., discovered an important and previously unrecognized chert formation, possibly several thousand feet thick, of Devonian or Carboniferous age, in the Tolovana district. S. R. Capps, working in the Kantishna district, on the north front of the Alaska Range, obtained evidence indicating that the Cantwell formation is considerably older than the Tertiary coal-bearing rocks and is possibly separated from those rocks by a significant unconformity. The Cantwell formation and the Tertiary coal-bearing rocks have been supposed to be of the same age, as they both apparently carry the Kenai flora. G. C. Martin, A. G. Maddren, and R. M. Overbeck, working in the Nenana coal field, discovered that the burning of the coal beds, which is still in progress, began during or before Pleistocene time. The Pleistocene gravels contain abundant worn fragments of burned shale and clinker derived from the burned Tertiary coal beds. This fact proves that these gravels, previously referred tentatively to the Tertiary, are separated from the Tertiary coal-bearing strata by an unconformity, and it affords a criterion for the recognition of the younger gravels, which in obscure outcrops can not otherwise be readily distinguished from the gravel members of the Tertiary beds. Mr. Mertie discovered that in the Fairbanks district and also on Seward Peninsula the tungsten and gold mineralization were apparently independent of each other.

DIVISION OF CHEMICAL AND PHYSICAL RESEARCH.

In the chemical laboratory 265 quantitative analyses and 1,490 qualitative determinations of rocks and minerals were reported during the year, the samples tested consisting chiefly of minerals sent in for inspection.

F. W. Clarke, in cooperation with W. C. Wheeler, completed for publication Professional Paper 102, "The inorganic constituents of marine invertebrates." He also published papers entitled "The constitution of melilite and gehlenite" and "Geochemical evidence as to early forms of life." The work on marine invertebrates is being extended still further. At its centennial celebration, in January, the

Russian Mineralogical Society elected Mr. Clarke an honorary member.

George Steiger, in cooperation with Dr. T. L. Watson, State geologist of Virginia, published a note on the effect of manganese on the coloration of amethyst and rose quartz. In cooperation with E. S. Larsen he published "Mineralogic notes." Mr. Steiger had charge of the administrative work of the division and also during the winter and spring he devoted much time to drawing plans, making estimates, and moving the laboratory to the new building.

W. T. Schaller continued his work on a number of unfinished manuscripts, prepared for the division of mineral resources reports on mica, precious stones, lithium, thorium, zirconium, and rare-earth minerals, published papers on the two new minerals crandallite and magnesioludwigite, and continued his study of uranium and vanadium minerals. An investigation of a water-soluble blue molybdenum mineral from Utah showed it to be ilsemannite, which was proved to be a sulphate of molybdenum. Mr. Schaller also prepared an exhibition of specimens in the National Museum illustrating the occurrence and association of the gem tourmalines of southern California and undertook a field investigation of the deposits of phlogopite mica in the United States. Much of Mr. Schaller's time was taken up with routine mineralogic and chemical investigations.

Experimental work on several problems involving physical chemistry was carried on by R. C. Wells. In addition to analyzing a number of rocks from Panama, including some that have been involved in the slides, Mr. Wells found that these rocks are particularly susceptible to the moisture conditions of the atmosphere and that they gain and lose weight in definite dependence on the humidity of the air. These results were transmitted to Mr. D. F. MacDonald, the geologist investigating the slides, in a report "The variable water content of certain rocks from Panama." In cooperation with R. V. A. Mills, Mr. Wells has begun a new line of study of oil-field waters with reference to their evaporation and concentration by natural gases. This work, which is nearly completed, has included analyses of waters, evaporation crusts, and rocks and the determination of the solubility of certain compounds under the special conditions involved, as well as a study of the water content of natural gases and the relative amounts of gas and water and of salts dissolved in water present in oil-field sands. Mr. Wells prepared a paper "On the solubility of calcite in sea water in contact with the atmosphere, and its variation with temperature," to be published in a Carnegie Institution publication with papers by T. W. Vaughan and others on similar subjects, and a report on "New determinations of carbon dioxide in water of the Gulf of Mexico," to be published in the Survey's "Shorter contributions to general geology." In cooperation with E. S. Larsen, Mr. Wells

published a paper on "Lorettoite, a new mineral." His routine analytical work included analyses of six pegmatites, two platinum ores, a chromite, four lead ores, five iron ores, and two so-called "paraffin earths."

W. B. Hicks devoted nearly all of his time to routine work, consisting mainly of the analyses of miscellaneous samples, including glauconite and brines, with special reference to their potash content. In conjunction with Mr. Bailey he described a new method for determining potash in glauconite, which has been published as a part of G. H. Ashley's report on greensands (Bulletin 660–B).

R. K. Bailey was engaged in routine work from July to October in connection with the Survey's potash investigation. Since October, 1916, he has been at Cliffside, Tex., where the Survey is drilling a well in search for potash, and has been testing the samples as they come from this and other wells. He has also visited other drilling operations in the vicinity and collected samples and well records.

Chase Palmer devoted a large part of his time to routine work, consisting of miscellaneous chemical analyses of rocks, minerals, oil shales, brines, oil-field waters, and distillates from oil shales. He was also occupied with research on the relations of oil-field waters from California. During the year he published in Economic Geology an article called "Diarsenides as silver precipitants." The conduct of several arsenical minerals has been determined, and their capacities as precipitants of metallic silver have been measured. The chemical nature of iron in the mineral löllingite has also been determined. A reagent by which the proportion of a simple arsenide may be determined in mineral mixtures containing also arsenosulphides and bisulphides is given in the article. The chemical facts which have been thus learned afford a rational explanation of the replacement deposits of metallic silver in the rich silver district of Cobalt, Ontario.

In the physical laboratory the investigations noted in previous reports have been continued under the direction of C. E. Van Orstrand. Considerable time has been given to an extension of the paper on earth temperatures. Temperature measurements were made in six wells of exceptional depth in the vicinity of Clarksburg, W. Va. A. F. Melcher made a number of determinations of the porosity of oil and gas bearing sands and devoted considerable time to the preparation of a paper dealing with the subject. He also assisted R. V. A. Mills in conducting an experiment on the migration of natural oil in certain sands.

In addition to his administrative work as chief of the division G. F. Becker has been occupied mainly in studies of capillarity and heat conduction from the geologist's point of view. His paper on "Mechanics of the Panama Canal slides" appeared as Professional Paper 98–N.

During the fiscal year a total of 1,231 letters were written in the division, of which 868 were numbered letters and 363 were for the signature of members of the division.

DIVISION OF MINERAL RESOURCES.

The Survey has continued its policy of making the annual report "Mineral Resources of the United States" more than a statistical compilation by recording and interpreting industrial progress and especially by treating in full the sources from which the mineral products of the country are obtained. This report is an annual inventory of the Nation's mineral resources.

During the last 14 years the separate chapters have been prepared in large part by geologists of the Survey who have specialized in the respective subjects treated, with a view to carrying out the provision of the organic act of the Survey which directs the examination of the mineral resources and products of the national domain.

Cooperation between the Geological Survey and the State surveys in collecting most of the mineral statistics continued in force in the preparation of the report for 1916. The 15 States that cooperated were Alabama, Florida, Illinois, Iowa, Maryland, Michigan, Minnesota, Missouri, New Jersey, New York, North Carolina, Oregon, Virginia, Washington, and Wisconsin. By this cooperation duplication of a considerable amount of work is obviated, and the producers are saved the annoyance of preparing two sets of statistical returns. On June 30, 1917, the manuscripts of 11 chapters for the report for 1916 had been completed and transmitted to the printer.

The entrance of this country into the war has served to increase the demand for information concerning our mineral resources, and as a result a bulletin entitled "Our mineral supplies," supplementing Bulletin 599, "Our mineral reserves," is being prepared. This bulletin reviews in a brief way the condition of the mineral industry with reference to its ability to supply the many and varied demands caused by war. Thirty chapters of this bulletin have been prepared during the year. The Council of National Defense was furnished a complete set of manuscript statements for every mineral of importance, showing production, imports, consumption, and sources of supply, with diagrams. This information was furnished promptly—within two or three days after being called for—and represented in tabloid form the up to the minute data available through the division of mineral resources. Through its committees the council has also called upon the Geological Survey for more detailed information concerning mineral resources. An increased demand has been made for information concerning the basic mineral resource—coal. The publication of monthly statements of shipments of coal was begun during the year. This information was of much value to the coal

committee of the Council of National Defense, but the call for more detailed information as to mine capacity, shipping facilities, etc., could be supplied only by enlarging the scope of the inquiry carried on by the Geological Survey. To accomplish this end the force was temporarily increased by the addition of five employees, and the publication of weekly statements of coal shipments was also begun.

The Tariff Commission also availed itself of the information at hand in the Geological Survey and called for a statement of condensed figures and data concerning nearly every mineral. This information also was furnished promptly. All these inquiries and the preparation of Bulletin 666 have been undertaken with comparatively little increase of force, causing, however, some delay in the publication of the annual report.

In response to a general demand for prompt and impartial statistics relating to the broader phases of the petroleum industry, the division began the collection and publication of monthly statistics showing the quantity of crude oil moved from field sources, the quantity delivered to refiners or to consumers, and the quantity in storage at the end of each month for each of the major fields of oil production east of the Rocky Mountains. These summaries are necessarily incomplete, for owing to the magnitude of this great industry in the United States complete statistics of production can be obtained but once a year, and even then require at least six months for their collection and compilation. The monthly statements, which include comparative statistics for the current month, the month immediately preceding, and the corresponding month in 1916, are compiled from reports submitted voluntarily by about 200 pipe-line and refining companies and furnish a valuable and timely index to the status of the industry in each field, accounting for between 90 and 95 per cent of the crude oil marketed each month in the area designated.

Preliminary estimates of output in 1916 were issued in December, 1916, or January, 1917, with reviews of the conditions that prevailed during the year, in the form of special press bulletins on the following subjects: Bauxite and aluminum; cement; chromite; coal; coke; copper, gold, and silver (general); gold and silver in Alaska; iron ore; lead; lime; mineral products; petroleum; potash; quicksilver; sulphur; zinc; and metal production in Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, South Dakota, Utah, and Washington (mine reports). Advance statements giving the final figures for the production of copper, lead, and other substances in 1916 have also been published.

The employees who devote their entire time to the work of the division in Washington number 36, and 8 are stationed in the field offices at Salt Lake City, Denver, and San Francisco. In addition

to these, 24 specialists give part of their time to the work of the division, making a total of 68 persons.

During the year 217,986 pieces of first-class mail matter were sent out by the division and 77,315 pieces were received.

H. D. McCaskey continued as geologist in charge of the division, in charge of the metals section, and of the three offices of the division in the Western States; E. F. Burchard was geologist in charge of the nonmetals section of the division during the year and continued as an author of several chapters of Mineral Resources of the United States; and G. F. Loughlin has been designated as geologist acting in charge of the nonmetals section of the division to assist him. Owing to the death of R. B. Dole the preparation of the report on mineral waters has been assigned to O. E. Meinzer, of the water-resources branch. E. S. Bastin, who has been on leave of absence, has been succeeded by H. G. Ferguson in the preparation of the report on graphite. The reports formerly prepared by W. C. Phalen, who has been transferred to the Bureau of Mines, have been assigned to other geologists already on the staff of the division, except that on sulphur and pyrite, which has been assigned to P. S. Smith.

The reports on the several mineral products were prepared by the following persons:

Authors of chapters in Mineral Resources.

Author.	Subject.
A. H. Brooks	Gold, silver, and copper in Alaska.
E. F. Burchard	Cement; fluorspar and cryolite; iron ore, pig iron, and steel.
B. S. Butler	Copper (general report); copper and silver in Michigan (mines report).
Martha B. Clark	Mineral products of United States (summary) (with H. D. McCaskey).
J. S. Diller	Asbestos; chromite; talc and soapstone.
J. P. Dunlop	Silver, copper, lead, and zinc in the Central States, except Michigan (mines report); secondary metals; metals and ores (summary report); gold and silver (general report) (with H. D. McCaskey).
H. G. Ferguson	Graphite.
H. S. Gale	Borax; magnesite (with C. G. Yale); nitrates.
C. N. Gerry	Gold, silver, copper, lead, and zinc in Idaho and Washington (mines reports).
V. C. Heikes	Gold, silver, copper, lead, and zinc in Arizona, Montana, Nevada, and Utah (mines reports).
C. W. Henderson	Gold, silver, copper, lead, and zinc in Colorado, New Mexico, South Dakota, Texas, and Wyoming (mines reports).
F. L. Hess	Antimony, arsenic, bismuth, cobalt, molybdenum, nickel, selenium, tantalum, tungsten, titanium, vanadium, uranium, tin.
D. F. Hewett	Manganese and manganiferous ores.
J. M. Hill	Aluminum and bauxite; barytes; mineral paints; platinum and allied metals; strontium ore; gold, silver, copper, lead, and zinc in the Eastern States (mines report).
F. J. Katz	Abrasives; feldspar; silica (quartz).
C. E. Lesher	Coal; fuel briquetting; the manufacture of coke.
G. F. Loughlin	Building stone; lime; slate.
H. D. McCaskey	Gold and silver (general report) (with J. P. Dunlop); mineral products of the United States (summary report) (with Martha B. Clark); quicksilver.
O. E. Meinzer	Mineral waters.
Jefferson Middleton	Clay-working industries; fuller's earth; sand-lime brick.
J. D. Northrop	Asphalt and bituminous rock; natural gas; petroleum.
C. E. Siebenthal	Lead; zinc and cadmium (general reports).
W. T. Schaller	Gems and precious stones; mica.
P. S. Smith	Sulphur and pyrite.
R. W. Stone	Gypsum; phosphate rock; sand and gravel; salt, bromine, and calcium chloride.
J. S. Turp	Peat.
C. G. Yale	Borax; magnesite (with H. S. Gale); gold, silver, copper, lead, and zinc in California and Oregon (mines report).

The offices of the division at Denver, Salt Lake City, and San Francisco are under direct charge of C. W. Henderson, V. C. Heikes, and C. G. Yale, respectively, who prepare the mine reports on gold, silver, copper, lead, and zinc in the Western States. They also act in cooperation with other members of the Survey where necessary, both in the field and in the office, and by keeping in close touch with the mining regions of the West they procure and disseminate much valuable information not readily obtained otherwise. These offices are, therefore, general Survey headquarters and bureaus of information in their respective regions. The Denver office, at 409 New Post Office Building, prepares the metal-mine reports for South Dakota, Wyoming, Colorado, and New Mexico; the Salt Lake City office, at 312 Post Office Building, covers in the same way the States of Montana, Idaho, Washington, Utah, Nevada, and Arizona; and the San Francisco office, at 305 Customhouse, is the headquarters for California and Oregon.

TOPOGRAPHIC BRANCH.

ORGANIZATION.

The organization of the topographic branch is as follows:

Chief geographer, R. B. Marshall.
Atlantic division, Frank Sutton, geographer, in charge.
Central division, W. H. Herron, geographer, in charge.
Rocky Mountain division, C. H. Birdseye, topographic engineer, in charge.
Northwestern division, T. G. Gerdine, geographer, in charge.
Pacific division, G. R. Davis, geographer, in charge.
Division of military surveys, Glenn S. Smith, topographic engineer, in charge.
Inspector of topography, J. H. Renshawe, geographer; W. M. Beaman and A. M. Walker, topographic engineers.

PERSONNEL.

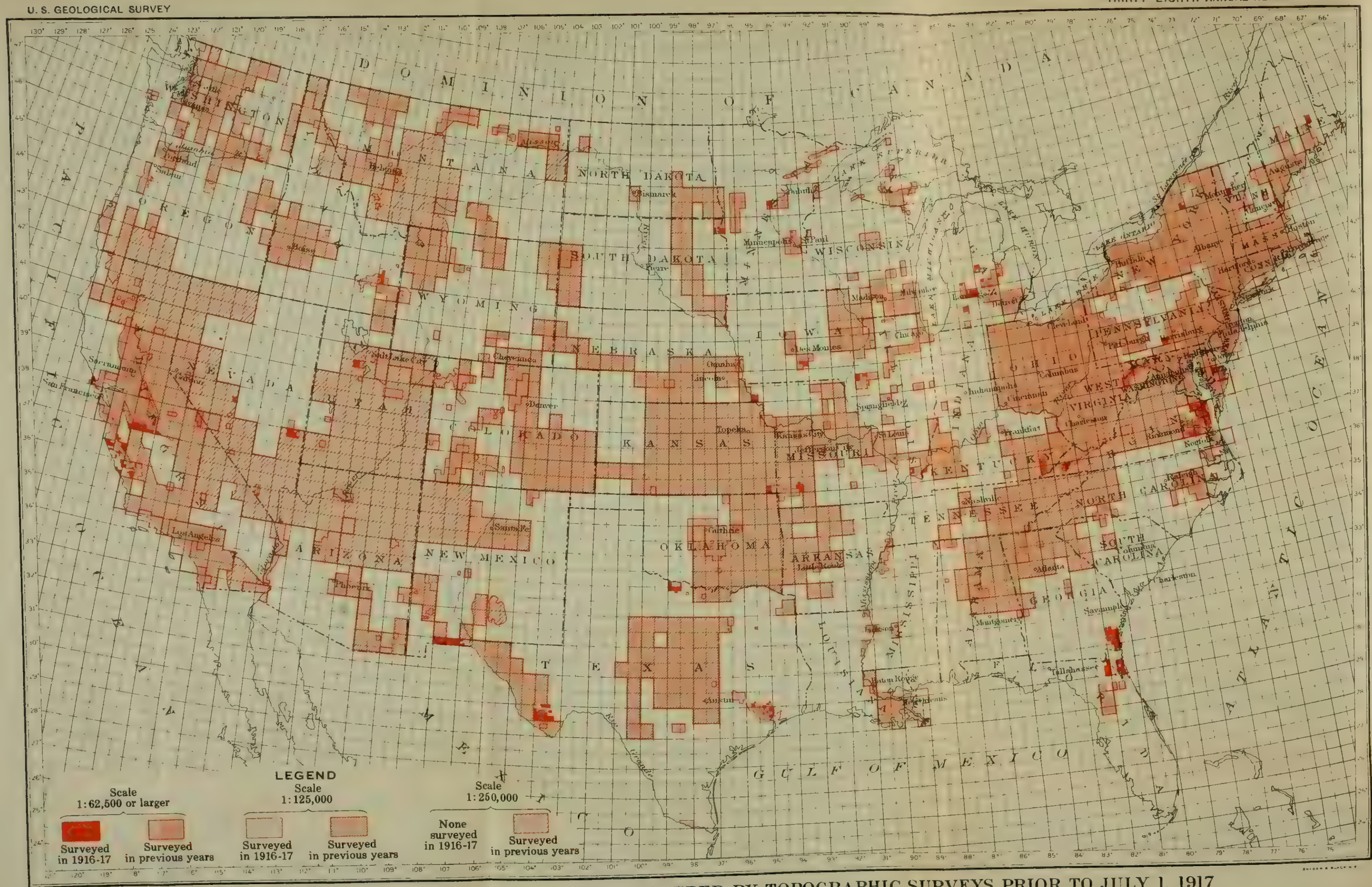
The technical corps of the topographic branch was increased during the year by the reinstatement of two topographic engineers and one junior topographer and by the appointment of 14 junior topographers and the transfer of 1 draftsman, and was reduced 16 by death and resignations. With those changes the corps now includes 1 chief geographer, 8 geographers, 38 topographic engineers, 17 topographers, 41 assistant topographers, 44 junior topographers, and 6 draftsmen—a total of 155. In addition, 40 technical field assistants were employed during the whole or a part of the field season. One topographer, 1 assistant topographer, and 6 junior topographers are on furlough. The clerical force comprises 11 clerks of various grades.

The following members of the topographic branch received commissions in the Engineer Officers' Reserve Corps on or prior to June 30, 1917:

Maj. W. M. Beaman.
Maj. R. H. Chapman.
Maj. W. H. Griffin.
Maj. G. T. Hawkins.
Maj. W. H. Herron.
Maj. J. H. Jennings.
Maj. R. B. Marshall.
Maj. Robert Muldrow.
Maj. A. C. Roberts.
Maj. G. S. Smith.
Maj. Frank Sutton.
Maj. A. M. Walker.
Maj. J. H. Wheat.
Capt. R. W. Berry.
Capt. C. H. Birdseye.
Capt. Basil Duke.
Capt. A. T. Fowler.
Capt. C. E. Giffin.
Capt. Duncan Hannegan.
Capt. H. H. Hodgeson.
Capt. E. I. Ireland.
Capt. B. A. Jenkins.
Capt. C. B. Kendall.
Capt. E. L. McNair.
Capt. W. L. Miller.
Capt. Albert Pike.
Capt. C. L. Sadler.
Capt. A. B. Searle.
Capt. J. G. Staack.
Capt. W. O. Tufts.
First Lieut. J. E. Blackburn.
First Lieut. A. O. Burkland.
First Lieut. J. R. Eakin.
First Lieut. R. T. Evans.
First Lieut. S. P. Floore.
First Lieut. R. A. Kiger.
First Lieut. E. L. Hain.
First Lieut. L. L. Lee.
First Lieut. L. S. Leopold.
First Lieut. T. H. Moncure.
First Lieut. W. H. S. Morey.
First Lieut. O. H. Nelson.
First Lieut. A. J. Ogle.
First Lieut. S. T. Penick.
First Lieut. T. F. Slaughter.
Second Lieut. S. H. Birdseye.
Second Lieut. D. S. Birkett.
Second Lieut. E. C. Burt.
Second Lieut. Howard Clark.
Second Lieut. F. A. Danforth.
Second Lieut. C. H. Davey.
Second Lieut. W. S. Gehres.
Second Lieut. W. F. Hicks.
Second Lieut. R. M. Herrington.
Second Lieut. J. B. Leavitt.
Second Lieut. Kostka Mudd.
Second Lieut. J. M. Rawls.
Second Lieut. L. B. Roberts.
Second Lieut. M. A. Roudabush.
Second Lieut. O. G. Taylor.
Second Lieut. J. H. Wilson.

PUBLICATIONS.

The published work of the topographic branch for the fiscal year consists of 85 published maps and 7 bulletins, giving results of spirit leveling in Arkansas, Georgia, Mississippi, North Carolina, New Mexico, South Dakota, and Texas. Brief summaries of the book publications (Bulletins 635, 636, 637, 638, 639, 643, and 646) are given on pages 20, 23 and 24. The remaining 16 parts of Bulletin 644, "Triangulation and primary traverse in the United States, 1913–1915," were published separately and were also combined with the two parts previously published and issued in one volume. A new edition of "Geographic tables and formulas" (Bulletin 650) was published, and the report on spirit leveling in Ohio (Bulletin 651) was practically ready for distribution at the end of the fiscal year. Manuscript for the results of leveling in Nevada, New York, Illinois, Kentucky, and Washington was transmitted for publication.



MAP OF THE UNITED STATES SHOWING AREAS COVERED BY TOPOGRAPHIC SURVEYS PRIOR TO JULY 1, 1917

AND THE SCALE EMPLOYED FOR EACH AREA

Scale 1/14,000,000

100 0 100 200 300 400 500 Miles

115° 114° 113° 112° 111° 110°
D O M
M O N T
Helena
W Y O
Salt Lake City
A H

ALLOTMENTS.

The total appropriations for topographic surveys for the fiscal year 1917 were:

Topographic surveys	$350,000
Surveying national forests	75,000
Statutory salaries	9,200
Special military maps	35,000
	469,200

Allotments of these appropriations were made as follows:

Allotments from funds appropriated for topographic work, fiscal year 1917.

	Topographic surveys, statutory salaries, and special military maps.	Surveying national forests.
General administration	$26,798	$5,250
Clerical assistance and supervision	15,040	3,080
Map editing	3,436	704
Purchase and repair of instruments, stationery, etc	34,426	3,466
Millionth-scale map	20,000	.....
Work by land-classification board	9,000	2,500
Field work:		
Atlantic division	58,000	.....
Atlantic division, special military maps	35,000	.....
Central division	45,000	.....
Rocky Mountain division	60,000	16,000
Northwestern division	40,000	25,500
Pacific division	47,500	18,500
	394,200	75,000

COOPERATION.

Cooperation has been maintained in 16 States, which contributed the following amounts:

California	$14,000.00	New York	$10,000.00
California, special river surveys	1,000.00	Oregon	1,000.00
Illinois	9,000.00	Texas	9,636.07
Iowa	1,750.00	Vermont	2,500.00
Kentucky	10,000.00	Virginia	4,500.00
Maine	5,000.00	Washington	11,500.00
Michigan	15,000.00	West Virginia	4,304.62
Minnesota	4,250.00	Wisconsin	3,000.00
Missouri [1]	3,000.00		
			109,440.69

SUMMARY OF RESULTS.

The condition of topographic surveys to June 30, 1917, distinguished as to scale, etc., is shown on Plate II.

[1] Agreement was entered into, but the State money did not become available until after the Federal funds were diverted to military mapping.

As shown in the following tables, the total new area mapped was 20,103 square miles, making the total area surveyed to date in the United States 1,257,623 square miles, or 41.5 per cent of the entire country. In addition, 2,377 square miles of resurvey was completed, making the total area of surveys during the year 22,480 square miles.

In connection with these surveys, 6,190 linear miles of primary levels were run, making 266,011 miles of primary and precise levels run since the authorization of this work by Congress in 1896. In the course of this work 1,512 permanent bench marks were established. In addition, 208 linear miles of river surveys were run.

Triangulation stations to the number of 243 were occupied and 203 were permanently marked. Primary traverse lines aggregating 4,058 miles were run, in connection with which 358 permanent marks were set.

The area covered by topographic surveys in Alaska during the fiscal year, as reported in detail on pages 82–87, was 9,765 square miles.

Present condition of topographic surveys of the United States and new area surveyed July 1, 1916, to June 30, 1917.

	New area mapped July 1, 1916, to June 30, 1917.	Total area mapped to June 30, 1917.	Percentage of total area of State mapped to June 30, 1917.
	Sq. mi.	*Sq mi.*	
Alabama		19,192	37
Arizona	594	70,136	62
Arkansas		21,494	40
California	2,648	119,618	76
Colorado	530	50,980	49
Connecticut		4,965	100
Delaware	534	1,736	73
District of Columbia		70	100
Florida	1,016	3,355	6
Georgia	1,320	18,907	32
Idaho	942	28,196	33
Illinois	702	15,946	28
Indiana		3,609	10
Iowa	151	11,916	21
Kansas		64,159	78
Kentucky	80	18,094	45
Louisiana		8,366	17
Maine	210	9,975	30
Maryland		12,327	100
Massachusetts		8,266	100
Michigan	1,103	8,198	14
Minnesota	389	7,354	9
Mississippi		2,126	4
Missouri	188	36,913	53
Montana	722	58,511	40
Nebraska	65	26,817	35
Nevada	26	51,141	46
New Hampshire	99	3,479	37
New Jersey		8,224	100
New Mexico	1,469	40,049	33
New York	304	44,663	91
North Carolina		18,390	35
North Dakota		9,814	14
Ohio		41,040	100
Oklahoma	57	39,908	57
Oregon	259	24,662	26
Pennsylvania	228	25,136	56
Rhode Island		1,248	100
South Carolina		5,640	18
South Dakota	139	19,032	25
Tennessee		21,283	50

Present condition of topographic surveys of the United States and new area surveyed July 1, 1916, to June 30, 1917—Continued.

	New area mapped July 1, 1916, to June 30, 1917.	Total area mapped to June 30, 1917.	Percentage of total area of State mapped to June 30, 1917.
	Sq. mi.	*Sq. mi.*	
Texas	1,676	70,976	27
Utah	228	69,025	82
Vermont	67	4,473	47
Virginia	2,004	31,984	75
Washington	1,579	29,325	42
West Virginia	.....	24,170	100
Wisconsin	90	12,692	23
Wyoming	684	30,043	31
Total, United States	20,103	1,257,623	41.5
Hawaii	1,393	.....	.....

SPECIAL MILITARY SURVEYS.

Summary.—The special appropriation of $35,000 which was made by Congress for the War Department for the topographic survey of such areas as it might select was allotted to the Geological Survey and devoted entirely to mapping in Virginia. This work in Virginia was continued and the mapping of other areas was commenced after March 26, under the arrangement that the total available balance of funds in the topographic branch should be used in making maps to meet the urgent needs of the War Department. Under this arrangement surveys were commenced in New Hampshire, Delaware, and Pennsylvania under the direction of Mr. Sutton; in Georgia and Florida under the direction of Mr. Herron; in Texas under the direction of Mr. Birdseye; and in Arizona and New Mexico under the direction of Mr. Gerdine; while in California the mapping in progress at the request of the War Department was continued and that of new areas was undertaken under the direction of Mr. Davis. The mapping of this class accomplished before the end of the fiscal year amounted to —— square miles, and the results are given below by States.

Arizona.—The survey of the United States portion of the Perilla quadrangle, lying partly in the Chiricahua National Forest, in Cochise County, Ariz., and Grant County, N. Mex., was completed by J. E. Blackburn and Cornelius Schnurr, the area mapped being 223 square miles, for publication on the scale of 1:125,000, with a contour interval of 100 feet. Of this area 13 square miles is within the national forest.

California.—The survey of the Piedras Blancas, Point Sur, and Posts quadrangles, lying partly in the Monterey National Forest, in Monterey and San Luis Obispo counties, was completed, and that of the Jamesburg, Lucia, King City, Junipero Serra, Metz, Gonzales,

San Simeon, Gorda, Bryson, Adelaida, and San Miguel quadrangles, lying partly in the Monterey National Forest, in Monterey, San Benito, and San Luis Obispo counties, was begun by T. P. Pendleton, C. A. Stonesifer, W. B. Upton, jr., N. E. Ballmer, E. G. Hamilton, William Stranahan, C. R. Fisher, Roscoe Reeves, R. C. Seitz, K. W. Trimble, C. P. McKinley, C. A. Ecklund, J. P. Harrison, R. M. Wilson, E. P. Davis, Charles Hartmann, R. T. Evans, W. G. Carson, C. W. H. Nessler, Bruce Jameyson, E. T. Walker, and Fred Rider, the total area mapped being 1,057 square miles, for publication on the scale of 1:62,500, with a contour interval of 50 feet. Of this area 153 square miles is included within the national forest. For the control of these areas and of the San Benito, Bonanza, and Hollister quadrangles, in the same counties, R. C. Seitz and L. F. Biggs ran 594 miles of primary levels and established 129 permanent bench marks, and C. F. Urquhart and Mr. Biggs occupied 42 triangulation stations and marked 21. In addition, 79 miles of primary levels were run, and 12 permanent bench marks were set to close other level circuits. In connection with the mapping of the Adelaida and San Miguel quadrangles, Mr. Upton made a plan and profile survey of portions of Salinas, Nacimiento, and San Antonio rivers, the distance traversed being 48 linear miles, for publication on the scale of 1:48,000.

Delaware.—The survey of the Millsboro quadrangle, in Sussex County, was completed, and that of the Harrington, Cedar Creek, and Cape Henlopen quadrangles, in Sussex and Kent counties, was begun by W. H. Griffin, F. W. Crisp, R. A. Kiger, S. P. Floore, A. B. Searle, C. E. Cooke, A. P. Meade, L. B. Glasgow, J. F. McBeth, and J. H. Wilson, the total area mapped being 543 square miles, for publication on the scale of 1:62,500, with contour intervals of 10 and 20 feet. This work includes 9 square miles of resurvey in Caroline County, Md. For the control of these areas Mr. Wilson ran 123 miles of primary traverse and set 8 permanent bench marks, and S. H. Birdseye ran 129 miles of primary levels and established 22 permanent bench marks.

Florida.—The survey of the Lawtey quadrangle, in Baker and Bradford counties, was completed, and that of the Middleburg, Maclenny, Orange Park, Cambon, Jacksonville, Palm Valley, Fernandina, and Mayport quadrangles, in Duval, Baker, Nassau, St. Johns, and Clay counties, was begun by J. H. Jennings, Gilbert Young, Fred Graff, jr., M. A. Roudabush, C. L. Sadler, O. G. Taylor, R. M. Harrington, W. L. Miller, J. B. Leavitt, Horace Raynor, and C. W. Stump, jr., the total area mapped being 1,070 square miles, for publication on the scale of 1:62,500, with a contour interval of 10 feet. Of this area 64 square miles is in Charlton County, Ga. For the control of these areas and of the Hilliard, St. Marys, Green Cove

Springs, and St. Augustine quadrangles, in Clay, Duval, Nassau, and St. Johns counties, C. B. Kendall, E. L. McNair, and H. S. Senseney ran 471 miles of primary traverse and set 37 permanent marks, and W. S. Gehres, S. L. Parker, and J. C. Hilliard ran 297 miles of primary levels and set 64 permanent bench marks.

Georgia.—The survey of the Everett City, Bladen, and Hortense quadrangles, in Camden, Charlton, Wayne, and Liberty counties, was completed and that of the Nahunta, Kingsland, Jesup, and Moniac quadrangles, in Camden, Charlton, Wayne and Liberty counties, was begun by Albert Pike, R. L. Harrison, L. L. Lee, J. M. Rawls, C. W. Goodlove, J. A. Duck, T. H. Moncure, F. W. Farnsworth, E. J. Essick, W. F. Hicks, and R. H. Kilmer, the total area mapped being 1,211 square miles, for publication on the scale of 1:62,500, with a contour interval of 10 feet. For the control of these areas and of the Boulogne, Folkstone, Hinesville, Savannah, Winokur, Ludowici, Limerick, Darien, Offerman, Brunswick, Travisville, Eulonia, Glenville, Waycross, Coffee, Sessoms, Wilcox, Broxton, Leliaton, Fargo, Haylow, Naylor, Valdosta, Sparks, Tifton, and Homerville quadrangles, in Camden, Charlton, Liberty, Chatham, Ware, Pierce, McIntosh, Wayne, Clinch, Echols, Coffee, Jeff Davis, Appling, Glynn, Berrien, and Colquitt counties, Oscar Jones, E. L. McNair, and H. S. Senseney ran 1,164 miles of primary traverse and set 93 permanent bench marks, and R. G. Clinite and Messrs. Hicks and Senseney ran 495 miles of primary levels and established 145 permanent bench marks. Of the primary traverse, 18 miles and 2 permanent marks are in South Carolina.

New Hampshire.—The survey of the Mount Pawtuckaway, Alton, and Gilmanton quadrangles, in Strafford, Rockingham, Belknap, and Merrimack counties, was commenced by Hersey Munroe, L. B. Roberts, A. J. Kavanagh, J. B. Metcalfe, jr., and Robert Muldrow, the total area mapped being 99 square miles, for publication on the scale of 1:62,500, with a contour interval of 20 feet. For the control of these areas and of the Suncook quadrangle, in Merrimack, Rockingham, and Hillsboro counties, G. T. Hawkins and Mr. Metcalfe occupied 13 triangulation stations and marked 11, and C. H. Semper ran 116 miles of primary levels and established 26 permanent bench marks.

New Mexico.—The survey of the United States portions of the Columbus, Hermanas, Mount Riley, and Camel Mountain quadrangles, in Dona Ana and Luna counties, was completed, and that of the Noria quadrangle, in Dona Ana and Luna counties, was begun by J. E. Blackburn, A. J. Ogle, Bishop Moorhead, C. C. Gardner, F. A. Danforth, J. G. Staack, H. K. McDonald, J. L. Lewis, R. H. Reineck, F. L. Whaley, W. R. Chenoweth, C. E. Giffin, and G. C. Douglas, the total area mapped being 985 square miles, for publication on the scale of 1:62,500, with contour intervals of

10 and 50 feet. For the control of these areas and of the Cancitillo, Ash Springs No. 1, Victorio, and Big Hatchet Peak quadrangles, in Dona Ana and Grant counties, C. L. Nelson, G. T. Hawkins, and B. H. Yoakum occupied 38 triangulation stations and marked 39, and F. A. Danforth, R. B. Steele, and R. W. Burchard ran 437 miles of primary levels and established 125 permanent bench marks.

Pennsylvania.—For the control of the Pocono quadrangle, which includes the artillery range in the vicinity of Tobyhanna, in Monroe and Lackawanna counties, R. H. Chapman and E. C. Burt occupied 6 triangulation stations and marked 3, and Mr. Burt ran 30 miles of primary levels and established 11 permanent bench marks.

Texas.—The survey of the Tascotal Mesa and Agua Fria quadrangles, in Brewster and Presidio counties, was completed and that of the Buck Hill, Jordan Gap, Santiago Peak, and Nine Point Mesa quadrangles, in Brewster County, was begun by A. O. Burkland, S. G. Lunde, R. W. Berry, O. H. Nelson, S. T. Penick, C. C. Holder, H. H. Hodgeson, C. G. Anderson, H. E. Simmons, W. O. Tufts, R. R. Monbeck, and J. R. Eakin, the total area mapped being 983 square miles, for publication on the scale of 1:62,500, with contour intervals of 25 and 50 feet For the control of these areas and of the Hood Spring, Bone Spring, Bullis Gap, and Dove Mountain quadrangles, in Brewster and Presidio counties, Mr. Anderson and J. R. Ellis occupied 10 triangulation stations and marked 8; D. S. Birkett and R. R. Monbeck ran 268 miles of primary levels and established 66 permanent bench marks; and Mr. Burkland established 5 permanent bench marks by vertical angulation.

Virginia.—The survey of the Kilmarnock, Mathews, Urbanna, Heathsville, and Morattico quadrangles and the resurvey of the Ewell quadrangle, in Middlesex, Mathews, Lancaster, Gloucester, King and Queen, Northumberland, and Richmond counties, was completed, and the survey of the Toano, Disputanta, Tappahannock, Charles City, Aylett, and Surry quadrangles, in Charles City, Henrico, New Kent, King and Queen, James City, King William, Caroline, Hanover, Surry, Prince George, and Essex counties was begun by T. F. Slaughter, Albert Pike, L. B. Roberts, W. H. S. Morey, R. L. Harrison, E. I. Ireland, J. B. Metcalfe, jr., C. H. Davey, Klett McKinley, J. I. Gayetty, J. A. Duck, S. H. Birdseye, S. T. Penick, J. M. Whitman, Duncan Hannegan, F. W. Hughes, Kostka Mudd, W. J. Lloyd, Fred McLaughlin, A. T. Fowler, Olinus Smith, C. S. Wells, J. H. Wilke, and P. W. McMillen, the total new area surveyed being 2,004 square miles and that resurveyed being 17 square miles, for publication on the scale of 1:62,500, with contour intervals of 10 and 20 feet. Of the area resurveyed 9 square miles is in Somerset County, Md. For the control of these areas E. L. McNair, J. H. Wilson, and Olinus Smith ran 721 miles of primary traverse and set 63 permanent marks,

and F. J. McMaugh, F. L. Shalibo, DeWitt McLaughlin, E. E. Harris, Stanley Druhot, Kostka Mudd, and S. R. Archer ran 1,009 miles of primary levels and established 234 permanent bench marks.

GENERAL OFFICE WORK.

Results of computations for vertical and horizontal control were copied and catalogued.

The computations of control data were made principally by D. H. Baldwin, T. M. Bannon, D. S. Birkett, G. T. Hawkins, Oscar Jones, C. B. Kendall, F. J. McMaugh, E. L. McNair, J. B. Metcalfe, jr., C. L. Nelson, H. S. Senseney, J. G. Staack, S. G. Lunde, S. R. Archer, and J. H. Wilson, under the immediate supervision of E. M. Douglas, geographer. Computing by L. F. Biggs and C. F. Urquhart was done in the Sacramento office. S. S. Gannett, geographer, was engaged in preparing manuscript and compiling data for bulletins submitted for publication, in miscellaneous computations, and in furnishing triangulation and leveling data for field and office use.

J. H. Renshawe was engaged during the year in preparing relief maps of the United States, of Salem, Oreg., and vicinity, and of the State of Ohio and in revising the relief map of Alaska.

The preparation of the special topographic maps to be used in the transcontinental guidebooks was continued by A. C. Roberts and R. C. McKinney. The different railroads supplied all available profile and alinement data and rendered other valuable assistance.

INSPECTION OF TOPOGRAPHIC MAPPING.

W. M. Beaman continued the supervision of the field and office work on the map of Washington and vicinity, spent three months inspecting field work in the Rocky Mountain, Northwestern, and Pacific divisions, and two months in revision work in Arizona. A. M. Walker spent three months in the field inspection of work in the Atlantic, Central, and Rocky Mountain divisions. The office duties of Messrs. Beaman and Walker covered the supervision of the preparation of all topographic field sheets for engraving and photolithography. In the examination of sheets prior to their transmission they were assisted throughout the year by L. S. Leopold.

J. H. Renshawe spent the entire year in the office on special work in relief shading, as reported in detail above.

MILLIONTH-SCALE MAP OF THE UNITED STATES.

Of the work in progress last year on the 1:1,000,000-scale map of the United States, under the direction of A. F. Hassan, the base map of Idaho (parts of sheets K–11, K–12, L–11, L–12, and M–11) was completed. About 10,000 additional square miles of the base map of

Colorado (part of sheet J–13) was compiled. The mapping of the Coastal Plain area of Texas, between Brazos River and the Rio Grande, was 90 per cent completed, and the base maps of South Carolina and Minnesota were revised. Four base maps of areas in the vicinity of Saypo, Billings, Bozeman, and Bowdoin, Mont., and one of Clarke, Choctaw, and Washington counties, Ala., were prepared for the geologic branch.

ATLANTIC DIVISION.

FIELD WORK.

Summary.—During the year topographic mapping was carried on in Delaware, Florida, Georgia, Maine, Mississippi, New York, New Hampshire, Pennsylvania, Vermont, Virginia, and West Virginia. This work included the completion of the survey of 15 quadrangles and of the resurvey of 2 quadrangles, in addition to which 31 quadrangles were partly surveyed and 2 were partly resurveyed.

Primary triangulation and primary traverse were carried on by nine parties in Delaware, Florida, Georgia, Maine, New Hampshire, New York, Pennsylvania, Vermont, and Virginia.

Topographic surveys in Atlantic division from July 1, 1916, to June 30, 1917.

State.	Contour interval.	For publication on scale of—			Total area surveyed.	Primary levels.		Primary traverse.		Triangulation stations.	
		1:62,500		1:21,120		Distance run.	Bench marks.	Distance run.	Permanent marks.	Occupied.	Marked.
		New.	Resurvey.	New.							
	Feet.	*Sq. mi.*	*Sq. mi.*	*Sq. mi.*	*Sq. mi.*	*Miles.*		*Miles.*			
Delaware	10, 20	534	.....	.....	534	129	22	123	8	.....	.....
Florida	10	1,016	.....	.....	1,016	297	64	471	37	.....	.....
Georgia	10	1,320	.....	.....	1,320	494	145	1,146	91	.....	.....
Maine	20	210	106	.....	316	115	28	.....	.....	19	24
Maryland	10	.....	18	.....	18	.....	.....	.....	.....	.....	.....
New Hampshire	20	99	136	.....	235	132	29	.....	.....	13	11
New York	20	214	.....	90	304	45	11	185	26	.....	.....
Pennsylvania	20	228	.....	.....	228	91	32	.....	.....	6	3
South Carolina	.....	.....	.....	.....	.....	.....	.....	18	2	.....	.....
Vermont	20	67	.....	.....	67	53	16	.....	.....	9	9
Virginia	10, 50	2,004	332	.....	2,336	1,062	249	721	63	.....	.....
West Virginia	50	.....	412	.....	412	88	23	.....	.....	.....	.....
		5,692	1,004	90	6,786	2,506	619	2,664	227	47	47

Maine.—For the continuation of cooperative topographic surveys the Public Utilities Commission allotted $5,000 and the United States Geological Survey allotted an equal amount. The survey of the Winn quadrangle, in Penobscot County, was completed by W. H. Griffin, J. B. Metcalfe, jr., and C. W. Arnold, the total area mapped being 210 square miles, for publication on the scale of 1:62,500, with a contour interval of 20 feet. For the control of the Winn and Seboeis quadrangles, in Penobscot County, J. C. Beam ran 90 miles of primary levels and established 21 permanent bench marks. For the control of the Millinocket and Mattewamkeag quadrangles, in Penob-

scot County, and of the Brooks and Burnham quadrangles, in Waldo, Somerset, and Kennebec counties, Oscar Jones occupied 19 triangulation stations and marked 24.

Maine and New Hampshire.—The resurvey of the Dover quadrangle, in York County, Maine, and Rockingham and Strafford counties, N. H., was completed by Hersey Munroe, and that of the York quadrangle, in the same counties, was continued by J. H. Wheat, W. H. Griffin, C. W. Arnold, and Robert Muldrow, the total area mapped being 242 square miles, for publication on the scale of 1:62,500, with a contour interval of 20 feet. Of this area 106 square miles is in Maine. For the control of these areas C. W. Arnold and C. H. Stewart ran 41 miles of primary levels and established 10 permanent bench marks, of which 25 miles and 7 marks were in Maine.

New York.—For the continuation of cooperative topographic surveys the State engineer and surveyor allotted $10,000 and the United States Geological Survey an equal amount. The survey of the Oswegatchie quadrangle, in Herkimer, Lewis, and St. Lawrence counties, was completed and that of the Cranberry Lake quadrangle, in the same counties, was continued by W. J. Lloyd, A. P. Meade, J. M. Whitman, and G. H. Guerdrum, the total area mapped being 214 square miles, for publication on the scale of 1:62,500, with a contour interval of 20 feet. For the control of the Andes quadrangle, in Delaware, Sullivan, and Ulster counties, F. J. McMaugh ran 22 miles of primary traverse and set 5 permanent marks. For the control of the Cranberry Lake, Stark, Nicholville, Childwood, and Rathbone quadrangles, in Hamilton, Herkimer, St. Lawrence, Franklin, and Steuben counties, C. B. Kendall ran 116 miles of primary traverse, set 21 permanent marks, and occupied 37 secondary triangulation stations along the lake shore, and K. E. Schlachter and F. L. Shalibo ran 45 miles of primary levels and established 11 permanent bench marks.

In addition to the cooperative work in New York, a survey of an area, including the Plattsburg training camp, in Clinton County, was made for the use of the United States Army by C. E. Cooke, F. W. Crisp, and E. W. Bowler, the area mapped being 90 square miles, for publication on the scale of 3 inches to 1 mile, with a contour interval of 5 feet. For the control of this area Mr. Crisp ran 47 miles of primary traverse.

Pennsylvania.—The survey of the Newville quadrangle, in Cumberland, Adams, Perry, and Franklin counties, was completed by Duncan Hannegan, R. A. Kiger, and C. H. Davey, the area mapped being 228 square miles, for publication on the scale of 1:62,500, with a contour interval of 20 feet. For the control of this area DeWitt McLaughlin ran 51 miles of primary levels and established 21 permanent bench marks.

Vermont.—For the continuation of cooperative topographic surveys the governor of Vermont allotted $2,500 and the United States Geological Survey an equal amount. The survey of the Waitsfield quadrangle, in Addison and Washington counties, was commenced by W. H. S. Morey and K. E. Schlachter, the area mapped being 67 square miles for publication on the scale of 1:62,500, with a contour interval of 20 feet. For the control of the Waitsfield, Bolton, Montpelier, Northfield, Hyde Park, and Barre quadrangles, in Washington, Lamoille, Addison, and Orange counties, Oscar Jones and C. B. Kendall occupied and marked 9 primary triangulation stations, and for the control of the Waitsfield quadrangle Mr. Schlachter ran 53 miles of primary levels and established 16 permanent bench marks.

Virginia.—For the continuation of cooperative topographic surveys the State geologist allotted $4,500 and the United States Geological Survey an equal amount. The resurvey of the Wise quadrangle and that of the coal area within the Coeburn quadrangle, in Russell, Wise, and Scott counties, was completed by Fred McLaughlin, T. F. Slaughter, Kostka Mudd, and J. B. Leavitt, the total area mapped being 324 square miles, for publication on the scale of 1:62,500, with a contour interval of 50 feet. For the control of these areas Mr. McLaughlin ran 53 miles of primary levels and established 15 permanent bench marks.

West Virginia.—For the continuation of cooperative topographic surveys the State geologist allotted $4,304.62 and the United States Geological Survey allotted $2,000. A resurvey of the portions of the Davis, Elk Garden, Onego, Keyser, and Horton quadrangles lying in Mineral and Tucker counties was completed by E. I. Ireland, J. I. Gayetty, and Klett McKinley, the total area mapped being 412 square miles, for publication on the scale of 1:62,500, with a contour interval of 50 feet. For the control of this area E. E. Harris ran 76 miles of primary levels and established 20 permanent bench marks. For the control of the Piedmont quadrangle, in Tucker, Mineral, and Grant counties, K. F. Maxcy ran 12 miles of primary levels and established 3 permanent bench marks.

OFFICE WORK.

The drafting of the following topographic maps was completed: Black Lake, Ga.; Winn, Maine; Dover, Maine-N. H.; Oswegatchie and Plattsburg training camp, N. Y.; Newville, Pa.; Kilmarnock, Mathews, Urbanna, Heathsville, Ewell, and Morattico, Va.

Progress in the drafting of additional sheets was made as follows: York, Maine-N. H., 40 per cent; Memphis, Tenn.-Ark., 70 per cent; Waitsfield, Vt., 15 per cent; Coeburn, Va., 43 per cent; Davis, W. Va., 58 per cent; Elk Garden, W. Va., 5 per cent; Keyser, W. Va., 25 per cent.

Primary-level circuits were adjusted for the following quadrangles: Black Lake, Ga.; Seboeis, Winn, and York, Maine; Dover, N. H.; Childwold, Cranberry Lake, Plattsburg, Potsdam, Rathbone, and Stark, N. Y.; Newville, Pa.; Charles City, Kilmarnock, Heathsville, Mathews, Morattico, Surry, Disputanta, Tappahannock, Toano, and Urbanna, Va.; Waitsfield, Vt.; Davis, Elk Garden, and Keyser, W. Va.

Geographic positions were computed for the following quadrangles: Cedar Creek, Harrington, Rehoboth, and Millsboro, Del.; Cambon, Hilliard, Ates Creek, Boulogne, Green Cove Springs, Kingsland, Middleburg, Orange Park, St. Marys, Jacksonville, Lawtey, and Maclenny, Fla.; Black Lake, Eulonia, Griswoldville, Hinesville, Jesup, Limerick, Ludowici, Maclenny, Ossabaw Island, Moniac, Bladen, Nahunta, Glennville, and Savannah, Ga.; Brooks, Burnham, Mattawamkeag, Millinocket, and Seboeis, Maine; Andes, Childwold, Cranberry Lake, Nicholville, Plattsburg, Stark, and Tupper Lake, N. Y.; Aylett, Charles City, Disputanta, Doswell, Heathsville, King William, Montross, New Kent, Piney Point, Morattico, Surry, Tappahannock, Toano, Urbanna, and Williamsburg, Va.; Bolton, Burlington, Montpelier, Northfield, and Waitsfield, Vt.; Davis, Elk Garden, and Keyser, W. Va.

CENTRAL DIVISION.

FIELD WORK.

Summary.—During the season topographic mapping was carried on in Illinois, Iowa, Kentucky, Michigan, Minnesota, Missouri, and Wisconsin. The work included the completion of the survey of 18 quadrangles and the resurvey of 3 quadrangles, in addition to which 6 quadrangles were partly surveyed.

Primary triangulation and primary traverse were carried on by three parties in Illinois, Kentucky, Michigan, and Wisconsin.

Topographic surveys in central division from July 1, 1916, to June 30, 1917.

State.	Contour interval.	For publication on scale of 1:62,500.		Total area surveyed.	Primary levels.		Primary traverse.		Triangulation stations.	
		New.	Resurvey.		Distance run.	Bench marks.	Distance run.	Permanent marks.	Occupied.	Marked.
	Feet.	*Sq. mi.*	*Sq. mi.*	*Sq. mi.*	*Miles.*		*Miles.*			
Illinois	20	702	30	732	122	29	163	7	.....	.....
Iowa	20	151	.....	151	.....	.....	.....	.....	.....	.....
Kentucky	20, 50	80	468	548	61	11	.....	.....	2	1
Michigan	5, 10, 20	1,103	.....	1,103	543	143	376	33	.....	.....
Minnesota	10	191	.....	191	98	22	.....	.....	.....	.....
Missouri	10	25	201	226	24	4	.....	.....	.....	.....
Ohio	.....	.....	.....	.....	148	22	.....	.....	.....	.....
Wisconsin	20	90	.....	90	68	16	77	6	.....	.....
	.....	2,342	699	3,041	1,064	247	616	46	2	1

Illinois.—The governor of Illinois allotted $9,000 for the continuation of cooperative topographic surveys, and the United States Geological Survey allotted an equal amount. The survey of the Vienna, Vermont, Goodhope, La Harpe, and Dixon quadrangles and of the Illinois portion of the Campbell Hill quadrangle, in Johnson, Massac, Pulaski, McDonough, Warren, Henderson, Hancock, Randolph, Lee, and Ogle counties, was completed by J. A. Duck, L. B. Glasgow, M. A. Roudabush, Gilbert Young, L. L. Lee, C. W. Goodlove, Ralph Wilcoxon, R. L. Harrison, and F. W. Hughes, the total area mapped being 702 square miles, for publication on the scale of 1:62,500, with a contour interval of 20 feet. The resurvey of the Wilmington quadrangle, in Will and Kankakee counties, was completed by Mr. Harrison, the area mapped being 30 square miles, for publication on the scale of 1:62,500, with a contour interval of 20 feet. For the control of the Vermont and Dongola quadrangles, in Fulton, McDonough, Schuyler, Union, Johnson, and Pulaski counties, J. H. Wilson ran 163 miles of primary traverse and set 7 permanent marks. For the control of the Dixon and Oregon quadrangles, in Lee and Ogle counties, H. S. Senseney ran 122 miles of primary levels and established 29 permanent bench marks.

Iowa.—The State Geological Survey allotted $1,750 for the continuation of cooperative topographic surveys, and the United States Geological Survey allotted an equal amount. The survey of the Chariton quadrangle, in Lucas and Warren counties, was completed and that of the Attica quadrangle, in Lucas, Monroe, and Marion counties, was begun by W. L. Miller, the total area mapped being 151 square miles, for publication on the scale of 1:62,500, with a contour interval of 20 feet.

Kentucky.—The Kentucky Geological Survey allotted $10,000 for the continuation of cooperative topographic surveys, and the United States Geological Survey allotted an equal amount. The resurvey of the Harlan and Hyden quadrangles, in Harlan, Leslie, and Perry counties, was completed by J. R. Eakin, F. W. Farnsworth, S. A. Judson, and E. J. Essick, the total area mapped being 468 square miles, for publication on the scale of 1:62,500, with a contour interval of 50 feet. The survey of the Kentucky portion of the Golconda quadrangle, in Livingston and Crittenden counties, was continued by C. W. Goodlove and W. S. Gehres, the area mapped being 80 square miles, for publication on the scale of 1:62,500, with a contour interval of 20 feet. For the control of the Harlan and Hyden quadrangles S. R. Archer ran 61 miles of primary levels and established 11 permanent bench marks, and E. L. McNair occupied 2 triangulation stations and marked 1.

Michigan.—For the continuation of cooperative topographic surveys the State geologist allotted $15,000 and the United States Geo-

logical Survey allotted an equal amount. The survey of the Elsie, Perrinton, Cedar Springs, Kalamazoo, Ionia, Lowell, Saginaw, Bay City, and Mount Pleasant quadrangles, in Clinton, Shiawassee, Gratiot, Saginaw, Ionia, Montcalm, Kent, Kalamazoo, Allegan, Barry, Eaton, Saginaw, Bay, and Isabella counties, was completed by L. L. Lee, J. G. Staack, Fred Graff, jr., E. L. Hain, S. H. Birdseye, A. B. Searle, Robert Muldrow, A. L. Opdycke, J. H. Jennings, E. C. Burt, C. L. Sadler, A. T. Fowler, and R. M. Harrington, the total area mapped being 1,103 square miles, for publication on the scale of 1:62,500, with contour intervals of 5, 10, and 20 feet. For the control of the Ionia, Lowell, Fenwick, Rives Junction, Big Prairie, Grove, and Springport quadrangles, in Ionia, Montcalm, Jackson, Ingham, Barry, Eaton, Kent, Allegan, Calhoun, Newaygo, and Mecosta counties, E. C. Bisbee and R. G. Clinite ran 543 miles of primary levels and established 143 permanent bench marks. For the control of the White Cloud, Big Prairie, Grove, Smyrna, Howard City, Big Rapids, Hersey, Nirvana, Tustin, Luther, Manton, Mesick, Fife Lake, Kalkaska, Bellaire, Elk Rapids, East Jordan, Torch Lake, Bay Shore, and Inwood quadrangles, in Newaygo, Mecosta, Montcalm, Kent, Osceola, Wexford, Grand Traverse, Kalkaska, Antrim, and Charlevoix counties, J. H. Wilson and H. S. Senseney ran 376 miles of primary traverse and set 33 permanent bench marks.

Minnesota.—The State drainage engineer of Minnesota allotted $4,250 for the continuation of cooperative topographic surveys, and the United States Geological Survey allotted an equal amount. The survey of the St. Francis and Pillager quadrangles, in Anoka, Isanti, Cass, Crow Wing, and Morrison counties, was completed by F. B. Barrett, W. S. Gehres, S. G. Lunde, J. L. Lewis, and J. M. Rawls, the total area mapped being 191 square miles, for publication on the scale of 1:62,500, with a contour interval of 10 feet. For the control of the Belle Prairie and Cushing quadrangles R. G. Clinite ran 98 miles of primary levels and established 22 permanent bench marks.

Missouri.—The State geologist of Missouri allotted $3,000 for the continuation of cooperative topographic surveys, and the United States Geological Survey allotted an equal amount. However, the State funds did not become available, and the work was continued with Federal money alone. The resurvey of the Halltown quadrangle (a portion of which had previously been resurveyed as the Aurora special), in Lawrence, Christian, and Greene counties, was begun, and the resurvey of that portion of the Stotts City and Greenfield quadrangles included within Greene County was completed by F. W. Hughes, the total area resurveyed being 201 square miles, for publication on the scale of 1:62,500, with a contour inter-

val of 10 feet. The survey of the Missouri portion of the Campbell Hill quadrangle, in Perry County, was completed by Gilbert Young and M. A. Roudabush, the area mapped being 25 square miles, for publication on the scale of 1:62,500, with a contour interval of 20 feet. For the control of the Stotts City and Sarcoxie quadrangles, in Lawrence and Jasper counties, F. L. Whaley ran 24 miles of primary levels and established 4 permanent bench marks.

Ohio.—For the purpose of correcting discrepancies that were known to exist in a few scatered bench-mark elevations, S. R. Archer ran 148 miles of primary levels and established 22 permanent bench marks.

Wisconsin.—The State geologist of Wisconsin allotted $3,000 for the continuation of cooperative topographic surveys, and the United States Geological Survey allotted an equal amount. The survey of the Mazomanie quadrangle, in Iowa, Dane, and Sauk counties, was begun by R. M. Herrington, the area mapped being 90 square miles, for publication on the scale of 1:62,500, with a contour interval of 20 feet. For the control of this area J. H. Wilson ran 77 miles of primary levels and set 6 permanent marks, and R. G. Clinite ran 68 miles of primary levels and established 16 permanent bench marks.

OFFICE WORK.

The drafting of the following topographic maps was completed: Vienna, Goodhope, La Harpe, Dixon, and Wilmington, Ill.; Lynn, Ind.; Chariton, Iowa; Harlan, Nolansburg, and Hyden, Ky.; Elsie, Perrinton, Cedar Springs, Kalamazoo, Ionia, Lowell, Saginaw, Bay City, and Mount Pleasant, Mich.; St. Francis and Pillager, Minn.; Halltown, and Spring City mining district, Mo.; Campbell Hill, Mo.-Ill.; Kelleys Island and Peebles, Ohio; Ripon, Wis.

Progress in the drafting of additional sheets was made as follows: Vermont, Ill., 18 per cent; Attica, Iowa, 55 per cent; Golconda, Ky.-Ill., 65 per cent; Greenfield, Mo., 8 per cent; Mazomanie, Wis., 40 per cent.

Primary-level circuits were adjusted for the following quadrangles: Lynn, Ind.; Dixon, Ill.; Fords Ferry, Golconda, Harlan, Hyden, and Nolansburg, Ky.; Bay City, Big Prairie, Carson City, Cedar Springs, Fenwick, Grove, Ionia, Kalamazoo, Lowell, Mount Pleasant, Muir, Rives Junction, Saginaw, Smyrna, and Springport, Mich.; Carthage, Greenfield, Halltown, Sarcoxie, and Stotts City, Mo.; Belle Prairie and Cushing, Minn.; Beardsley and Peever, Minn.-S. Dak.; Oak Hill, Roxabel, South Charleston, Springfield, Vermilion, and Wellington, Ohio.

Geographic positions were computed for the following quadrangles: Dongola, Jonesboro, Mound City, Thebes, and Vermont, Ill.; Barbourville, Corbin, Harlan, Hyden, Logmont, Middlesboro, and Pineville, Ky.; Bay City, Bay Shore, Bellaire, Big Prairie,

Big Rapids, Elk Rapids, Fife Lake, Grove, Hersey, Howard City, Kalkaska, Luther, Manton, Nirvana, Smyrna, Torch Lake, Tustin, and White Cloud, Mich.; Joplin district, Mo.; Craig, Maitland, Tarkio, and Atchison, Mo.-Kans.-Nebr.; Cross Plains, Denzer, Lone Rock, and Mazomanie, Wis.

ROCKY MOUNTAIN DIVISION.

FIELD WORK.

Summary.—During the season topographic mapping was carried on in Colorado, Kansas, Minnesota, Missouri, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, and Wyoming. The work included the completion of the survey of 27 quadrangles and the resurvey of 1 quadrangle and 1 special area, in addition to which 15 quadrangles were partly surveyed. Primary traverse and primary triangulations were carried on by four parties in Kansas, Missouri, Nebraska, North Dakota, Oklahoma, New Mexico, Texas, and Wyoming.

Topographic surveys in Rocky Mountain division from July 1, 1916, to June 30, 1917.

State.	Contour interval.	For publication on scale of—					Total area surveyed.
		1:125,000 (new).	1:62,500.		1:31,680 (new).	1:24,000 (resurvey).	
			New.	Resurvey.			
	Feet.	*Sq. mi.*	*Sq. mi.*	*Sq. mi.*	*Sq. mi.*	*Sq. mi.*	*Sq. mi.*
Colorado	50	530	.....	.....	.....	.....	530
Kansas	10	.....	.....	236	.....	.....	236
Minnesota	10	.....	198	.....	.....	.....	198
Missouri	20	.....	163	.....	.....	.....	163
Nebraska	20	.....	65	.....	.....	.....	65
New Mexico	10,50,100	387	985	.....	.....	8	1,380
North Dakota	.....	.....	.....	.....	.....	.....	.....
Oklahoma	25	.....	57	.....	.....	.....	57
South Dakota	10	.....	139	.....	.....	.....	139
Texas	1,5,25	.....	983	.....	693	.....	1,676
Wyoming	100	684	.....	.....	.....	.....	684
	.....	1,601	2,590	236	693	8	5,128

State.	Primary levels.		Primary traverse.		Triangulation stations.	
	Distance run.	Bench marks.	Distance run.	Permanent marks.	Occupied.	Marked.
	Miles.		*Miles.*			
Colorado	90	24	.....	.....	.....	.....
Kansas	171	18	6	.....	.....	.....
Minnesota	68	20	.....	.....	.....	.....
Missouri	19	5	55	5	.....	.....
Nebraska	.....	.....	14	.....	.....	.....
New Mexico	519	150	.....	.....	48	53
North Dakota	.....	.....	61	7	.....	.....
Oklahoma	26	5	492	58	.....	.....
South Dakota	5	1	.....	.....	.....	.....
Texas	371	90	.....	.....	14	12
Wyoming	115	30	.....	.....	.....	.....
	1,384	343	628	70	62	65

Colorado.—The survey of the Home and Naturita quadrangles, in Jackson, Larimer, Montrose, and San Miguel counties, was completed by Basil Duke, D. H. Watson, and C. A. Stonesifer, the total area mapped being 438 square miles, for publication on the scale of 1:125,000, with a contour interval of 100 feet. The mapping of the Daton Peak quadrangle, in Routt and Moffat counties, was completed by Mr. Duke, the area mapped being 92 square miles, for publication on the scale of 1:62,500, with a contour interval of 50 feet. For the control of the Naturita and Daton Peak quadrangles R. W. Burchard ran 90 miles of primary levels and established 24 permanent bench marks. In connection with the mapping of the Naturita quadrangle Mr. Burchard made a plan and profile survey of portions of San Miguel and Dolores rivers, the distance traversed being 83 linear miles, for publication on the scale of 1:48,000.

Kansas.—The resurvey of the Columbus quadrangle, in Cherokee County, was completed by R. A. Kiger, F. L. Whaley, and R. M. Herrington, the area mapped being 236 square miles, for publication on the scale of 1:62,500, with a contour interval of 10 feet. For the control of this area Mr. Whaley ran 171 miles of primary levels and established 18 permanent bench marks.

Missouri-Nebraska.—The survey of the Craig quadrangle, in Holt County, Mo., and Richardson County, Nebr., was completed by C. L. Sadler, the area mapped being 228 square miles, for publication on the scale of 1:62,500, with a contour interval of 20 feet. Of this area, 163 square miles is in Missouri. For the control of the Craig quadrangle J. H. Wilson ran 75 miles of primary traverse—55 in Missouri, 14 in Nebraska, and 6 in Kansas—and set 5 permanent bench marks, all in Missouri, and H. S. Senseney ran 19 miles of primary levels and established 5 permanent bench marks, all in Missouri.

Minnesota-South Dakota.—The survey of the Peever and Beardsley quadrangles, in Roberts County, S. Dak., and Traverse and Big Stone counties, Minn., was completed by S. P. Floore and A. J. Kavanagh, the total area mapped being 337 square miles, for publication on the scale of 1:62,500, with a contour interval of 10 feet. Of this area, 139 square miles is in South Dakota. For the control of these areas Mr. Kavanagh ran 73 miles of primary levels and established 21 permanent bench marks, 5 miles and 1 bench mark being in South Dakota.

North Dakota.—For the control of the Wilton quadrangle, in Oliver County, J. H. Wilson ran 61 miles of primary traverse and set 7 permanent marks.

New Mexico.—The survey of the Pelona quadrangle, lying partly in the Datil National Forest, in Socorro County, was completed by C. C. Gardner, the area mapped being 387 square miles, for publica-

tion on the scale of 1:125,000, with a contour interval of 100 feet. Of this area, 200 square miles is within the national forest. For the control of the Hagerman, Queen, Orange, Carlsbad, Avis, and Hope quadrangles, in Eddy, Otero, Lincoln, and Chaves counties, C. L. Nelson and B. H. Yoakum occupied 9 triangulation stations and marked 13. For the control of the Hagerman quadrangle R. W. Burchard ran 82 miles of primary levels and established 25 permanent bench marks.

The revision of the map of the Tyrone district, in Grant County, was completed by O. G. Taylor, the area covered being 8 square miles.

Oklahoma.—The survey of the Hominy quadrangle, in Osage County, was commenced by C. C. Holder and R. R. Monbeck, the area mapped being 57 square miles, for publication on the scale of 1:62,500, with a contour interval of 25 feet. For the control of the Hominy, Sac and Fox, Mallon, Yale, Skedee, Gray Horse, and Belford quadrangles, in Osage, Okfuskee, Lincoln, Creek, Payne, Pawnee, Kay, and Noble counties, B. H. Yoakum and W. F. Hicks ran 492 miles of primary traverse and set 58 permanent marks. For the control of the Hominy quadrangle Mr. Yoakum ran 26 miles of primary levels and established 5 permanent bench marks.

Texas.—For the completion of the cooperative topographic survey of Harris County the county contributed $9,636.07 and the United States Geological Survey allotted $5,000. The mapping of the Burnett Bay, Fauna, Humble, Crosby, La Porte, and Louetta quadrangles, the City of Houston portions of the Settegast, Houston Heights, Bellaire, and Park Place quadrangles, and the Harris County portions of the Moonshine Hill, Rose Hill, Scott Ranch, Spring, Stuebner, Walley, Weeden, Cedar Bayou, and Morgan Point quadrangles was completed, the total area mapped being 405 square miles, for publication on the scale of 1:31,680, with contour intervals of 1 and 5 feet. This work was done by S. T. Penick, T. P. Pendleton, Olinus Smith, C. A. Stonesifer, W. F. Hicks, B. A. Jenkins, Cornelius Schnurr, C. C. Holder, H. W. Peabody, F. A. Danforth, D. H. Watson, O. H. Nelson, L. B. Roberts, E. R. Bartlett, T. H. Moncure, R. R. Monbeck, J. B. Leavitt, A. J. Ogle, and O. G. Taylor.

In addition to the cooperative work the mapping of the West Wichita Falls, Iowa Park, Fowlkes, Beaver Creek, and Electra quadrangles, in Wichita and Wilbarger counties, was completed by R. W. Berry, E. R. Bartlett, R. R. Monbeck, J. G. Staack, and R. W. Burchard, the total area mapped being 288 square miles, for publication on the scale of 1:31,680, with a contour interval of 5 feet. For the control of these areas Mr. Monbeck ran 103 miles of primary levels and established 19 permanent bench marks. In connection with the scheme of triangulation in New Mexico C. L. Nelson and B. H.

Yoakum occupied and marked 1 triangulation station for the control of the Guadalupe Peak quadrangle, in El Paso County.

Wyoming.—The mapping of the Afton quadrangle, lying partly in the Wyoming National Forest, in Lincoln County, was continued by J. H. Wilke, Cornelius Schnurr, R. H. Reineck, and A. J. Ogle, the area mapped being 684 square miles, for publication on the scale of 1:125,000, with a contour interval of 100 feet. Of this area 615 square miles lies within the national forest. For the control of the Afton and Daniel quadrangles, in Lincoln County, D. C. Birkett ran 115 miles of primary levels and established 27 permanent bench marks and Mr. Wilke established 3 permanent bench marks by vertical angles. For the control of the Leo, Hanna, and Saddleback Hills quadrangles, in Carbon County, C. L. Nelson occupied and marked 3 triangulation stations.

OFFICE WORK.

The drafting of the following topographic maps was completed: Home and Daton Peak, Colo.; Columbus, Kans.; Craig, Mo.-Nebr.; Peever and Beardsley, Minn.-S. Dak.; Pelona, Tyrone district, Columbus, and Hermanas, N. Mex.; Aldine, Cedar Bayou, City of Houston, Burnett Bay, Fauna, Humble, Crosby, La Porte, Louetta, Settegast, Satsuma, Houston Heights, Harmaston, Hockley, Huffman, Bellaire, Park Place, Spring, Genoa, Moonshine Hill, Morgan Point, Rose Hill, Scott Ranch, Seabrook, Trinity Bay, Stuebner, Swanson, Walley, Weeden, Waller-Holik-Joseph, West Wichita Falls, Iowa Park, and Electra, Tex.

The drafting of the profile sheets of Dolores and San Miguel rivers, Colo., and Gila River, N. Mex., was 90 per cent completed.

Progress in the drafting of additional sheets was made as follows: Naturita, Colo., 39 per cent; Fowlkes, Tex., 35 per cent; Afton, Wyo., 96 per cent.

Primary-level circuits were adjusted for the following quadrangles: Naturita and Daton Peak, Colo.; Joplin district, Kans.; Hagerman and Roswell, N. Mex.; Hominy, Okla.; Beardsley and Peever, S. Dak.-Minn.; Daniel and Afton, Wyo.

Geographic positions were computed for the following quadrangles: Columbus and Joplin district, Kans.; Atchison, Maitland, Craig, and Tarkio, Kans.-Mo.-Neb.; Washburn and Wilton, N. Dak.; Pelona, N. Mex.; Belford, Claremore, Gray Horse, Hominy, Kaw, Mallon, Pawhuska, Sac and Fox, Skedee, and Yale, Okla.; Brenham, Katy, Liberty, Sealy, and Waller, Tex.; Hanna and Saddleback Hills, Wyo.

NORTHWESTERN DIVISION.

FIELD WORK.

Summary.—During the season topographic mapping was carried on in Idaho, Montana, Oregon, and Washington. The work included

the completion of the survey of 4 quadrangles, in addition to which 7 quadrangles were partly surveyed. A profile survey was made of two rivers, the distance traversed being 77 linear miles. Primary traverse and primary triangulation were carried on by five parties in Idaho, Montana, Oregon, and Washington.

Topographic surveys in northwestern division from July 1, 1916, to June 30, 1917.

State.	Contour intervals.	For publication on scale of—		Total area surveyed, new.	Primary levels.		Primary traverse.		Triangulation stations.	
		1:125,000	1:62,500		Distance run.	Bench marks.	Distance run.	Permanent marks.	Occupied.	Marked.
	Feet.	*Sq. mi.*	*Sq. mi.*	*Sq. mi.*	*Miles.*		*Miles.*			
Idaho	100	702	240	942	135	50	.....	.....	5	5
Montana	100	722	.....	722	206	58	.....	.....	9	9
Oregon	25, 50, 100	240	19	259	.....	2	.....	.....	25	25
Washington	50, 100	1,579	.....	1,579	129	28	150	15	.....	.....
	.....	3,243	259	3,502	470	138	150	15	39	39

Idaho.—The survey of the Paradise Valley quadrangle, in Bannock, Bingham, and Bonneville counties, was completed and that of the Ozone quadrangle, in the same counties, was begun by C. G. Anderson, the total area mapped being 240 square miles, for publication on the scale of 1:62,500, with a contour interval of 50 feet. For the control of these quadrangles Mr. Anderson occupied and marked 5 triangulation stations and E. M. Bandli ran 56 miles of primary levels and established 18 permanent bench marks. The survey of the Custer quadrangle, lying partly in the Challis and Sawtooth national forests, in Custer County, was continued by Albert Pike and H. E. Burney, the area mapped being 620 square miles, for publication on the scale of 1:125,000, with a contour interval of 100 feet. Of this area 550 square miles is included in the national forests. In connection with the mapping of the Custer quadrangle, Mr. Pike made a profile survey of upper Salmon River, the distance traversed being 30 linear miles, for publication on the scale of 1:31,680. For the control of the Custer and Challis quadrangles, in Custer County, Mr. Bandli ran 79 miles of primary levels and established 32 permanent bench marks.

Idaho-Montana.—The mapping of the St. Regis quadrangle, lying partly in the St. Joe, Lolo, and Cabinet national forests, in Shoshone County, Idaho, and Mineral and Sanders counties, Mont., was completed by J. E. Blackburn, the area mapped being 232 square miles, for publication on the scale of 1:125,000, with a contour interval of 100 feet. This area lies entirely within the national forests, 82 square miles being in Idaho.

Montana.—The mapping of the Drummond quadrangle, in Granite, Missoula, and Powell counties, was continued and that of the

Swan Lake quadrangle, lying within the Lewis and Clark, Kootenai, and Cabinet national forests, in Flathead and Missoula counties, was begun by K. W. Trimble, R. C. Seitz, and J. W. Muller, the total area mapped being 572 square miles, for publication on the scale of 1:125,000, with a contour interval of 100 feet. Of this area 178 square miles is within the national forests. For the control of the Swan Lake quadrangle Mr. Seitz ran 60 miles of primary levels and established 10 permanent bench marks and Mr. Muller established 3 permanent bench marks by vertical angles. For the control of the Huntley, Elso, Fattig, and Flat Willow quadrangles, in Yellowstone, Fergus, and Musselshell counties, G. T. Hawkins occupied and marked 9 triangulation stations and D. S. Birkett ran 146 miles of primary levels and established 45 permanent bench marks. In connection with the mapping of the Swan Lake quadrangle Mr. Muller made a profile survey of the lower part of Swan River, the distance traversed being 47 linear miles, for publication on the scale of 1:48,000.

Oregon.—For the continuation of cooperative topographic surveys the State engineer allotted $1,000 and the United States Geological Survey an equal amount. The mapping of the Oregon portion of the Troutdale quadrangle, in Multnomah County, was completed by Charles Hartmann, the area mapped being 19 square miles, for publication on the scale of 1:62,500, with a contour interval of 25 feet. For the control of the Cline Falls, Heisler, Prineville, and Round Mountain quadrangles, in Crook and Wasco counties, Mr. Hartmann occupied and marked 11 triangulation stations.

In addition to the cooperative work in Oregon, the mapping of the Twickenham quadrangle, lying partly in the Ochoco National Forest, in Wasco, Wheeler, and Crook counties, was continued by A. O. Burkland, the area mapped being 240 square miles, for publication on the scale of 1:125,000, with a contour interval of 100 feet. None of the area mapped is within the national forest. For the control of the Twickenham quadrangle Mr. Burkland established 2 permanent bench marks by vertical angles. For the control of the Diamond Peak, Maiden Peak, Mount Washington, Disston, and McKenzie Bridge quadrangles, in Linn, Lane, Crook, Klamath, and Douglas counties, J. G. Staack and S. G. Lunde occupied and marked 14 triangulation stations.

Washington.—For the continuation of cooperative topographic surveys the Washington State Board of Geological Survey allotted $11,500, and the United States Geological Survey allotted an equal amount. The mapping of the Connell quadrangle, in Adams, Franklin, and Walla Walla counties, was completed, and that of the Walla Walla quadrangle, in Columbia and Walla Walla counties, was continued by Fred Graff, jr., R. H. Reineck, H. L. McDonald, J. L. Lewis, S. G. Lunde, and A. O. Burkland, the total area mapped

being 1,391 square miles, for publication on the scale of 1:125,000, with a contour interval of 50 feet. For the control of the Connell, Othello, Wallula, and Red Rock quadrangles, in Franklin, Adams, Walla Walla, and Lincoln counties, D. S. Birkett ran 129 miles of primary levels and established 28 permanent bench marks.

In addition to the cooperative work in Washington, the mapping of the Mount St. Helens quadrangle, lying partly in the Rainier National Forest, in Clarke, Lewis, Cowlitz, and Skamania counties, was completed by J. L. Lewis, the area mapped being 188 square miles, for publication on the scale of 1:125,000, with a contour interval of 100 feet. Of this area 103 square miles is within the national forest. For the control of the Mount Rainier and Eatonville quadrangles, in Pierce and Lewis counties, G. T. Hawkins ran 150 miles of primary traverse and set 15 permanent marks.

OFFICE WORK.

The drafting of the following topographic maps was completed: Paradise Valley, Idaho; St. Regis, Idaho-Mont.; Porcupine Valley, Mont.; Connell and Mount St. Helens, Wash.

The drafting of profile sheets of the following rivers was completed: Upper Salmon, Idaho; lower Swan, Mont.

Progress in the drafting of additional sheets was made as follows: Custer, Idaho, 80 per cent; Drummond, Mont., 67 per cent; Troutdale, Oreg.-Wash., 33 per cent; Twickenham, Oreg., 33 per cent; Walla Walla, Wash., 69 per cent.

Primary-level circuits were adjusted for the following quadrangles: Ammon, Bay Horse, Custer, Cranes Flat, and Shelley, Idaho; Elso, Fattig, Huntley, and Swan Lake, Mont.; Troutdale, Oreg.; Connell, Hicksville, Othello, Priest Rapids, Red Rock, and Wallula, Wash.

Geographic positions were computed for the following quadrangles: Casto, Custer, and Rabbit Foot, Idaho; Fattig, Mont.; Cline Falls, Diamond Peak, Disston, Heisler, McKenzie Bridge, Maiden Peak, Mount Washington, Round Mountain, Prineville, and Wendling, Oreg.; Connell, Eatonville, Mount Rainier, Mount St. Helens, Riparia, and Tacoma, Wash.

PACIFIC DIVISION.

FIELD WORK.

Summary.—During the season topographic mapping was carried on in Arizona, California, Nevada, and Utah. This work included the completion of the survey of 25 quadrangles and 1 special area and the resurvey of 1 quadrangle and 2 special areas, in addition to which 22 quadrangles were partly surveyed and 1 was partly

resurveyed. In addition, a profile survey was made of portions of three rivers, the distance traversed being 48 linear miles. Primary triangulation was carried on by two parties in Arizona, California, and Nevada.

Topographic surveys in Pacific division from July 1, 1916, to June 30, 1917.

State.	Contour interval.	For publication on scale of—						
		1:125,000 (new).	1:62,500.		1:31,680 (new).	1:24,000.		1:12,000 (resurvey).
			New.	Resurvey.		New.	Resurvey.	
	Feet.	*Sq. mi.*	*Sq. mi.*	*Sq. mi.*	*Sq. mi.*	*Sq. mi.*	*Sq. mi.*	*Sq. mi.*
Arizona	25,100	594					67	8
California	5,25,100	465	1,230		953			
Nevada	25,50			355		26		
New Mexico	100	97						
Utah	50		228					
		1,156	1,458	355	953	26	67	8

State.	Total area surveyed.	Primary levels.		Triangulation stations.	
		Distance run.	Bench marks.	Occupied.	Marked.
	Sq. mi.	*Miles.*			
Arizona	669	55	13	4	3
California	2,648	690	144	80	41
Nevada	381	21	8	9	7
New Mexico	97				
Utah	228				
	4,027	766	165	93	51

Arizona.—The survey of the Chiricahua quadrangle, lying partly in the Chiricahua National Forest, in Cochise County, Ariz., and Grant County, N. Mex., was completed by J. E. Blackburn and Cornelius Schnurr, the area mapped being 468 square miles, for publication on the scale of 1:125,000, with a contour interval of 100 feet. Of this area, 97 square miles is within New Mexico, and 305 square miles within the national forest. The resurvey of the Oatman mining district, in Mohave County, and of Ray and vicinity, in Pinal County, was completed by B. A. Jenkins, D. H. Watson, and W. M. Beaman, the area resurveyed being 67 square miles for publication on the scale of 1:24,000 and 8 square miles for publication on the scale of 1:12,000, with a contour interval of 25 feet. For the control of the Oatman district L. F. Biggs occupied 4 triangulation stations and marked 3 and ran 53 miles of primary levels and established 13 permanent bench marks.

California.—For the continuation of cooperative topographic surveys in California the Department of Engineering allotted $14,000 and the United States Geological Survey an equal amount. In the

continuation of the mapping of San Joaquin Valley the survey of the San Luis Creek, Plainsberg, Lingard, Las Garzas Creek, Bliss Ranch, Chowchilla, Volta, Berendo, Los Banos, Sandy Mush, Kismet, Turner Ranch, Elgin, Daulton, No. 10, and San Luis Ranch 7½-minute quadrangles and of the Indian Gulch 15-minute quadrangle, in Merced, Madera, Stanislaus, Fresno, and Mariposa counties, was completed by N. E. Ballmer, Roscoe Reeves, J. H. LeFeaver, R. M. Wilson, R. T. Evans, C. A. Ecklund, and E. P. Davis, the total area mapped being 1,056 square miles—909 square miles for publication on the scale of 1:31,680, with a contour interval of 5 feet, and 147 square miles, for publication on the scale of 1:62,500, with a contour interval of 25 feet. For the control of the valley work L. F. Biggs occupied 20 triangulation stations and marked 4.

The Department of Engineering allotted an additional $1,000 for special river surveys in San Joaquin Valley. The survey of the Herndon, Friant, Kings River, No. 21, Wahtoke, Sanger, and Bridge quadrangles, in Madera and Fresno counties, was begun by R. T. Evans and C. A. Ecklund, the area mapped being 44 square miles, for publication on the scale of 1:31,680, with a contour interval of 5 feet. For the control of the Wahtoke and Sanger quadrangles Mr. Ecklund ran 17 miles of primary levels and established 3 permanent bench marks.

In addition to the cooperative work in California, the survey of the New Almaden, Double Point, and Point Reyes quadrangles, in Santa Clara, Santa Cruz, and Marin counties, was completed, and that of the Trimmer quadrangle, lying partly in the Sequoia and Sierra national forests, in Fresno and Tulare counties, was begun by C. A. Ecklund, R. T. Evans, J. P. Harrison, and C. P. McKinley, the total area mapped being 491 square miles—465 square miles for publication on the scale of 1:125,000, with a contour interval of 100 feet, and 26 square miles for publication on the scale of 1:62,500, with a contour interval of 25 feet. Of this area 347 square miles lies within the national forests. For the control of the Paynes Creek, Burney, Dixie, and Prattville quadrangles, in Shasta, Lassen, Plumas, and Tehama counties, C. F. Urquhart occupied 18 triangulation stations and marked 16.

Nevada.—The survey of the Rochester mining district, in Humboldt County, was completed by T. P. Pendleton, the area mapped being 26 square miles, for publication on the scale of 1:24,000, with a contour interval of 25 feet. The resurvey of the Highland quadrangle, in Lincoln County, was completed, and that of the northwest quarter of the Panaca quadrangle, in the same county, was continued by H. H. Hodgeson and W. B. Upton, jr., the area mapped being 355 square miles, for publication on the scale of 1:62,500, with a con-

tour interval of 50 feet. For the control of the Rochester mining district L. F. Biggs occupied 9 triangulation stations and marked 7 and ran 21 miles of primary levels and established 8 permanent bench marks.

Utah.—The survey of the Stockton quadrangle, in Tooele County, was completed by Gilbert Young and C. R. Fisher, the area mapped being 228 square miles, for publication on the scale of 1:62,500, with a contour interval of 50 feet.

OFFICE WORK.

The drafting of the following topographic maps was completed: Chiricahua and Salt River, Ariz.; Little Table Mountain, Berendo, Bliss Ranch, Lingard, Turner Ranch, Chowchilla, Sandy Mush, Plainsberg, Sulphur Springs, Le Grand, Raynor Creek, Indian Gulch, Kings River, New Almaden, Point Reyes, Double Point, La Grange, Ingomar, Kismet, San Luis Ranch, Merced Falls, Haystack Mountain, San Joaquin River, Point Sur, and Posts, Cal.; Highland and Rochester mining district, Nev.; Goodsprings, Cal.-Nev.; and Stockton, Utah.

Progress in the drafting of additional sheets was made as follows: Verde River, Ariz., 95 per cent; Daulton, Cal., 5 per cent; Elgin, Cal., 40 per cent; Los Banos, Cal., 45 per cent; No. 10, Cal., 40 per cent; Timmer, Cal., 20 per cent; northwest quarter Panaca, Nev., 62 per cent.

Level circuits were adjusted for the following quadrangles: Camp Verde and Kingman, Ariz.; Arroyo Grande, Cayucos, Jamesburg, Los Banos, Paso Robles, Sanger, San Miguel, Point Sur, and Wahtoke, Cal.; Lovelocks and Rochester mining district, Nev.

Geographic positions were computed for the following quadrangles: Oatman mining district, Ariz.; Point Sur, Jamesburg, Lucia, Metz, King City, Bradley, San Miguel, Bryson, San Simeon, Paynes Creek, Burney, Dixie, Prattville, Los Banos, Laguna Seca Ranch, No. 15, Elgin, No. 18, Mendota, No. 10, Sheep Ranch, No. 19, Center School, Firebaugh, Jamison, Dos Palos, No. 23, Kerman, Oxalis, Chaney Ranch, Carrisalito Springs, and Tranquillity, Cal.; Rochester mining district, Nev.

SECTION OF FIELD EQUIPMENT.

The section of field equipment has the custody of all field property, as well as topographic field notebooks and computation books. During the year it indexed and filed 354 triangulation and primary-traverse records and 194 spirit-leveling records. Equipment, consisting of three lathes, one drill press, 1 buffer and grinder, one universal grinder, and a few smaller tools, was ordered for the in-

strument-repair shop. No additions of importance were made to the stock of instruments other than the usual repair parts and supplies. In the distributing shop 159,000 square inches of plates were made, resurfaced, or electrotyped, besides usual repair work.

WATER-RESOURCES BRANCH.

ORGANIZATION.

The organization of the water-resources branch is as follows:

Chief of branch, N. C. Grover, chief hydraulic engineer.
Division of surface waters, John C. Hoyt, hydraulic engineer, in charge.
Division of ground waters, O. E. Meinzer, geologist, in charge.
Division of water utilization, N. C. Grover, chief hydraulic engineer, in charge.
Division of enlarged stock-raising homesteads, N. C. Grover, chief hydraulic engineer, in charge.

PERSONNEL.

During the year the technical force of the branch has been reduced 12 by transfers, resignations, and deaths, and has been increased 15 by new appointments. At the end of the year the force consisted of 1 chief hydraulic engineer, 12 hydraulic engineers, 4 engineers, 21 assistant engineers, 28 junior engineers, 1 geologist, 2 associate geologists, 1 assistant geologist, 1 geologic aid, 1 assistant chemist, and 1 classifier, a total of 73. Of this number 1 assistant engineer and 2 junior engineers are on furlough, and 1 hydraulic engineer and 3 assistant engineers are employed occasionally.

The following members of the water-resources branch received commissions on or prior to June 30, 1917:

A. H. Davison, Second Lieutenant, Engineer Officers' Reserve Corps.
H. J. Dean, First Lieutenant, Engineer Officers' Reserve Corps.
W. E. Dickinson, Second Lieutenant, Engineer Officers' Reserve Corps.
O. W. Hartwell, First Lieutenant, Engineer Officers' Reserve Corps.
C. C. Jacob, Captain, Engineer Officers' Reserve Corps.
G. K. Larrison, Captain, Artillery, Hawaii National Guard.
C. H. Pierce, First Lieutenant, Engineer Officers' Reserve Corps.

In the clerical force there were 4 separations and 8 accessions, and at the end of the year the force numbered 29.

ALLOTMENTS.

The appropriation for gaging streams was the same as in the preceding year ($150,000). The cooperative funds made available by State allotments have been increased in some States and decreased in others, making necessary corresponding adjustments of the work.

An appropriation of $150,000 for examination of lands under the stock-raising homestead law enacted December 29, 1916, was included

in the sundry civil act approved June 12, 1917, to be immediately available.

The appropriation for gaging streams for the fiscal year was allotted as follows:

Allotments of appropriation for gaging streams (investigation of water resources), 1916–17.

Administrative expenses of the Survey		$12,454
Administrative expenses of the branch		7,100
Computations and reports		17,500
Inspection		1,000
Stream gaging:		
New England States	$4,500	
New York	2,500	
Virginia and Maryland	600	
South Atlantic and Gulf States	4,500	
Texas	4,000	
Ohio Valley	8,000	
Upper Mississippi Valley States	6,500	
Colorado, Wyoming, and New Mexico	7,500	
Montana	4,000	
Utah	4,000	
Nevada	2,500	
Idaho	4,000	
Oregon	4,000	
Washington	4,000	
California	4,000	
Arizona	3,500	
Hawaii	4,500	
		72,600
Investigation of ground waters, including quality of waters		21,200
Land classification board		11,000
Water-power investigations		7,000
Contingent		146
		$150,000

Of the total appropriation, 62 per cent was allotted for work in public-land States.

COOPERATION.

States.—Cooperative funds were allotted by several States as follows:

Amounts allotted by States for cooperative work with United States Geological Survey in investigation of water resources.

Alabama		$175
Arizona		4,040
California:		
State engineer	$8,280	
State water commission	6,835	
City of San Francisco	4,380	
		19,495

Colorado		$530
Connecticut		770
Hawaii		16,000
Illinois		2,580
Iowa		500
Kansas		1,000
Kentucky		420
Maine		5,640
Massachusetts		2,370
Minnesota		2,470
Mississippi		550
Montana		2,760
Nevada		1,980
New York:		
State engineer	$1,500	
Conservation commission	9,835	
		11,335
North Dakota		300
Oregon		5,700
Texas		10,295
Utah		5,180
Vermont		1,245
Washington		6,230
Wisconsin		5,970
Wyoming		4,895

The work done under cooperative agreements with the States has been restricted to studies of stream flow except in California, Connecticut, Arizona, Montana, and Hawaii.

In California investigations of ground waters were continued in San Jacinto, Salinas, and Santa Clara valleys and in San Diego County, and measurements of depth to ground-water level were made in the southern part of the State.

The report on ground water in Sacramento Valley, work on which has been in progress for several years, was practically completed, and the report on the San Jacinto and Temecula basins and a special report on floods in southern California in January and February, 1916 (Water-Supply Paper 426), were submitted for publication.

In Connecticut the cooperative work consisted chiefly of ground-water surveys.

In Hawaii measurements of streams were supplemented by measurements of precipitation and studies of the loss of water in irrigation canals.

A compilation of stream-flow records in Massachusetts, which was in press at the beginning of the fiscal year, was issued as Water-Supply Paper 415, and a similar compilation of stream-flow records in Vermont is in press as Water-Supply Paper 424.

Investigations of ground water in Arizona were continued as in previous years in cooperation with the Agricultural Experiment Station, analyses of water being made at the experiment station.

An investigation of ground waters in Montana, begun in 1916 in cooperation with the State engineer, who collected well records throughout the State, and with the State Board of Health and Montana State College, at the chemical laboratory of which analyses of water were made, was also continued.

Reclamation Service.—The measurement of streams that are to furnish water to reclamation projects under construction has been continued in cooperation with the United States Reclamation Service. The field work is done by Survey engineers who are employed in the locality, and actual cost is repaid by the Reclamation Service through transfer of funds.

The Survey also continued to assist the Reclamation Service in an investigation undertaken to obtain a basis for the equitable distribution of the waters of Milk and St. Mary rivers—a work carried on under cooperative agreement with the Canadian Department of the Interior.

Office of Indian Affairs.—In accordance with authorizations by the Office of Indian Affairs, stream gaging was continued on the following Indian reservations: Colville, Crow, Fort Hall, Klamath, La Pointe, Menominee, Pine Ridge, Quinault, Rosebud, Standing Rock, Warm Springs, and Western Shoshone.

National Park Service.—Streams in the Yosemite, Glacier, and Yellowstone national parks were measured during the year at stations maintained in cooperation with the National Park Service.

War Department.—Stream measurements made in connection with studies of flood control and navigation in the Ohio River basin have been continued in cooperation with the Corps of Engineers, United States Army.

Reports on both surface and ground waters available for use at cantonments and other sites of military importance were prepared and submitted to the War Department.

Forest Service.—A study of stream flow in the Angeles National Forest, in southern California, in cooperation with the Forest Service, was continued.

City of San Francisco.—In connection with the proposed storage of the water of Tuolumne River in Hetch Hetchy Valley as a water supply for the city of San Francisco, measurement of that stream was continued in cooperation with the city government.

City of San Diego.—An investigation of the ground water in the part of San Diego County lying west of the divide was nearly completed. In this work the San Diego city government cooperated.

PUBLICATIONS.

The publications of the year prepared by the water-resources branch comprise 25 reports and 5 separate chapters. Titles and brief summaries of these publications are given on pages 26–30. At the

end of the year 22 other reports were in press and 8 manuscripts were awaiting editorial examination.

GENERAL SUMMARY.

In the investigation of surface waters the water-resources branch has maintained gaging stations for measuring discharge of streams in 41 States and in Hawaii and Alaska. The relatively large amount of work now in progress is, however, possible only because of extensive cooperation with States and other Federal organizations. Twenty-four cooperating States (including Hawaii) have contributed more than $110,000 for work in these States, and the Indian Office, Engineer Corps, Reclamation Service, and Forest Service have also cooperated largely in the study of flow of particular streams. The cooperating States include, besides many of the northern and eastern States, all the States in the Great Basin and on the Pacific slope and nearly all those in the Rocky Mountain and western Gulf groups, where water is necessary for irrigating agricultural lands.

Ground-water investigations have been made in 14 States and in Alaska, and five water-supply papers containing the results of such investigations have been published during the year.

Many investigations of ground water or quality of water were under way at the end of the year, but lack of funds prevents an enlargement of the work commensurate with the importance of the subject.

Many investigations of the present and probable future use of both surface and ground waters have been made in connection with the classification of the public lands, with special reference to their use for power, under permit, or for agriculture, under the enlarged-homestead, desert-land, or Carey acts. The results of such investigations are generally incorporated in unpublished special reports to the Commissioner of the General Land Office and to the Secretary of the Interior.

DIVISION OF SURFACE WATERS.

ORGANIZATION.

The work of the division of surface waters consists primarily of the measurement of the flow of rivers. In includes also special investigations of conditions affecting stream flow and the utilization of streams. In carrying on the work the United States is divided into 17 districts, including Hawaii. One of these districts (Kansas) was established during the year. The following list shows the location of the districts and district offices and gives the names of the engineers:

New England: C. H. Pierce, Customhouse, Boston, Mass.
New York: C. C. Covert, Federal Building, Albany, N. Y.
Middle Atlantic: G. C. Stevens, Washington, D. C.

South Atlantic and eastern Gulf: W. E. Hall, Federal Building, Atlanta, Ga.

Ohio River: A. H. Horton, Washington, D. C.

Upper Mississippi River: W. G. Hoyt, Capitol Building, Madison, Wis.; suboffices, Old Capitol Building, St. Paul, Minn.; Federal Building, Chicago, Ill.

Kansas: R. C. Rice, Federal Building, Topeka, Kans.

Upper Missouri: W. A. Lamb, Montana National Bank Building, Helena, Mont.

Rocky Mountain: Robert Follansbee, New Post Office Building, Denver, Colo.

Great Basin: C. C. Jacob, Federal Building, Salt Lake City, Utah.

Idaho: G. C. Baldwin, Idaho Building, Boise, Idaho.

Washington: G. L. Parker, Federal Building, Tacoma, Wash.

Oregon: F. F. Henshaw, Couch Building, Portland, Oreg.

California: H. D. McGlashan, Customhouse, San Francisco, Cal.; suboffice, Federal Building, Los Angeles, Cal.

Arizona: C. E. Ellsworth, Fleming Building, Phoenix, Ariz.

Texas: G. A. Gray, Old Post Office Building, Austin, Tex.

Hawaii: G. K. Larrison, Kapiolani Building, Honolulu, Hawaii.

CHARACTER AND METHODS OF WORK.

Field investigations incident to the work are made from the district offices, where the results are sufficiently analyzed to insure their accuracy and completeness. At selected places, known as gaging stations, measurements of discharge are made and other data are collected, from which the daily flow of the streams is computed. At the end of the year 1,178 gaging stations were being maintained, including 92 in Hawaii. During the year 259 stations were discontinued and 144 stations established. In addition records ready for publication were received for about 150 stations from other Government bureaus and private persons. During the year 7,769 measurements of discharge were made. Many of the stations are maintained in cooperation with other Federal bureaus, State organizations, or individuals.

Gaging stations and cooperating parties for the year ended June 30, 1917.

State.	Geological Survey alone.	Reclamation Service.	Forest Service.	Indian Service.	Army Engineers.	Weather Bureau.	Other Federal bureaus.	State cooperation.	Municipal cooperation.	Private persons.	Counted more than once.	Maintained at end of year.	Established during year.	Discontinued during year.	Regular gagings during year.	Miscellaneous gagings during year.
Alabama	....	....	....	....	1	....	....	4	....	.....	.....	5	.....	.....	6	.....
Arizona	....	1	....	6	2	....	....	18	....	2	5	24	3	2	266	61
California	....	....	29	2	....	2	6	151	23	42	104	151	21	17	1,207	379
Colorado	4	3	20	....	....	1	....	14	....	6	1	47	6	6	244	6
Connecticut	....	....	....	....	....	....	....	.....	....	1	.....	1	.....	1	11	.....
Florida	....	....	....	....	....	....	....	.....	....	.....	.....	.....	.....	.....	.....	11
Georgia	2	....	....	....	....	4	....	.....	....	18	2	22	4	3	53	9
Idaho	2	18	2	15	....	1	....	6	....	9	7	46	11	35	323	50
Illinois	....	....	....	....	1	1	....	25	....	1	2	26	3	1	93	1
Indiana	....	....	....	....	....	....	....	.....	....	1	.....	1	.....	1	.....	.....
Iowa	....	....	....	....	....	3	....	14	....	.....	3	14	1	1	42	1
Kansas	....	....	....	....	....	....	....	3	....	.....	.....	3	3	.....	4	.....
Kentucky	....	....	....	....	....	....	....	5	....	.....	.....	5	.....	.....	20	1
Maine	....	....	....	....	....	....	....	16	....	2	2	16	.....	.....	115	.....
Maryland	3	....	....	....	....	....	....	.....	....	.....	.....	3	.....	.....	10	.....
Massachusetts	....	....	....	....	....	....	....	17	....	1	1	17	.....	.....	143	2
Michigan	....	....	....	....	....	....	....	.....	1	1	.....	2	.....	.....	.....	.....
Minnesota	....	....	....	....	1	2	....	29	....	1	4	29	2	3	147	1

Gaging stations and cooperating parties for the year ended June 30, 1917—Continued.

State.	Geological Survey alone.	Reclamation Service.	Forest Service.	Indian Service.	Army Engineers.	Weather Bureau.	Other Federal bureaus.	State cooperation.	Municipal cooperation.	Private persons.	Counted more than once.	Maintained at end of year.	Established during year.	Discontinued during year.	Regular gagings during year.	Miscellaneous gagings during year.
Montana	8	35	14	7	....	1	....	23	....	1	1	88	8	30	445	10
Nevada	....	2	....	3	....	1	....	34	....	12	18	34	3	11	118	22
New Hampshire	....	....	....	....	....	....	....	....	....	6	....	6	2	....	20	2
New Jersey	1	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....
New Mexico	1	....	....	....	....	....	....	....	....	3	....	4	....	3	20	....
New York	....	....	....	....	1	4	....	48	1	18	24	48	7	10	431	16
North Carolina	1	....	....	....	....	1	....	....	....	3	....	5	....	4	21	....
North Dakota	....	....	....	1	....	....	....	5	....	....	....	6	....	....	30	....
Ohio	1	....	....	....	2	....	....	....	....	....	....	3	....	3	2	....
Oklahoma	....	4	....	....	....	....	....	....	....	....	....	4	....	....	2	....
Oregon	....	4	3	9	....	2	1	15	18	54	....	106	25	38	286	81
Rhode Island	....	....	....	....	....	....	....	....	....	....	....	....	....	1	4	....
South Carolina	....	....	....	....	....	....	1	....	....	....	....	1	....	....	3	....
South Dakota	....	....	....	4	....	....	....	....	....	1	....	5	....	....	29	2
Tennessee	....	....	....	....	....	2	....	....	....	6	....	8	1	1	40	4
Texas	....	1	....	....	....	4	....	39	4	2	11	39	7	1	367	16
Utah	....	2	....	5	....	....	....	118	....	89	96	118	17	23	881	122
Vermont	....	....	....	....	....	....	....	9	....	4	4	9	....	....	37	2
Virginia	2	....	....	....	....	1	....	....	....	2	....	5	....	5	25	1
Washington	3	1	8	13	....	....	1	7	2	30	1	64	6	3	360	63
West Virginia	8	....	....	....	6	1	....	....	....	2	....	17	....	25	52	2
Wisconsin	....	....	....	2	2	....	....	45	1	11	16	45	4	3	229	5
Wyoming	....	5	2	....	....	1	3	49	....	1	3	58	3	13	220	5
Hawaii	....	....	....	....	2	....	....	92	....	45	47	92	7	15	542	45
	36	76	78	67	18	32	12	786	50	375	352	1,178	144	259	6,849	920

Data collected from the district offices are transmitted to the Washington office, where they are reviewed in the computing section and prepared for publication. This review insures accuracy in the data and brings the results from different parts of the country to a uniform standard. Regular field inspections are made, and through annual conference of the engineers the work in the several districts is further standardized.

PUBLICATIONS.

For convenience and uniformity in publication the United States has been divided into 12 primary drainage basins, and the results of stream measurements are published annually in a series of progress reports that correspond to these 12 divisions. Prior to 1914 the records for each division were contained in a single water-supply paper; since 1914 the reports for the twelfth division have been published as three papers.

In addition to the progress reports, special reports on various hydraulic subjects have been completed for publication during the year.

The following table shows the division into drainage areas and gives numbers of water-supply papers containing results of stream measurements for 1899–1917:

Numbers of water-supply papers containing results of stream measurements, 1899–1917.

Year.	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII		
												North Pacific slope basins.		
	North Atlantic slope (St. John River to York River).	South Atlantic and eastern Gulf of Mexico (James River to the Mississippi).	Ohio River.	St. Lawrence River and Great Lakes.	Hudson Bay and upper Mississippi River.	Missouri River.	Lower Mississippi River.	Western Gulf of Mexico.	Colorado River.	Great Basin.	Pacific slope in California.	Pacific slope in Washington and upper Columbia River.	Snake River basin.	Lower Columbia River and Pacific slope in Oregon.
1899 [a]	35	[b] 35, 36	36	36	36	[c] 36, 37	37	37	[d] 37, 38	38, [e] 39	38, [f] 39	38	38	38
1900 [g]	47, [h] 48	48	48, [i] 49	49	49	49, [j] 50	50	50	50	51	51	51	51	51
1901	65, 75	65, 75	65, 75	65, 75	[k] 65, 66, 75	66, 75	[k] 65, 66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75
1902	82	[b] 82, 83	83	[l] 82, 83	[k] 83, 85	84	[k] 83, 84	84	85	85	85	85	85	85
1903	97	[b] 97, 98	98	97	[k]98, 99, [m]100	99	[k] 98, 99	99	100	100	100	100	100	100
1904	[n] 124, [o] 125, [p] 126	[p] 126, 127	128	129	[k] 128, 130	130, [q] 131	[k] 128, 131	132	133	133, [r] 134	134	135	135	135
1905	[n] 165, [o] 166, [p] 167	[p] 167, 168	169	170	171	172	[k] 179, 173	174	175, [s] 177	176, [r] 177	177	178	178	[t] 177, 178
1906	[n] 201, [o] 202 [p] 203	[p] 203, 204	205	206	207	208	[k] 205, 209	210	211	212, [r] 213	213	214	214	214
1907–8	241	242	243	244	245	246	247	248	249	250, [r] 251	251	252	252	252
1909	261	262	263	264	265	266	267	268	269	270, [r] 271	271	272	272	272
1910	281	282	283	284	285	286	287	288	289	290	291	292	292	292
1911	301	302	303	304	305	306	307	308	309	310	311	312	312	312
1912	321	322	323	324	325	326	327	328	329	330	331	332–A	332–B	332–C
1913	351	352	353	354	355	356	357	358	359	360	361	362–A	362–B	362–C
1914	381	382	383	384	385	386	387	388	389	390	391	392	393	394
1915	401	402	403	404	405	406	407	408	409	410	411	412	413	414
1916	431	432	433	434	435	436	437	438	439	440	441	442	443	444
1917	451	452	453	454	455	456	457	458	459	460	461	462	463	464

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39. Estimates for 1899 in Twenty-first Annual Report, Part IV.
[b] James River only.
[c] Gallatin River.
[d] Green and Gunnison rivers and Grand River above junction with Gunnison.
[e] Mohave River only.
[f] Kings and Kern rivers and south Pacific slope basins.
[g] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52. Estimates for 1900 in Twenty-second Annual Report, Part IV.
[h] Wissahickon and Schuylkill rivers to James River.
[i] Scioto River.
[j] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.
[k] Tributaries of Mississippi from east.
[l] Lake Ontario and tributaries to St. Lawrence River proper.
[m] Hudson Bay only.
[n] New England rivers only.
[o] Hudson River to Delaware River, inclusive.
[p] Susquehanna River to Yadkin River, inclusive.
[q] Platte and Kansas rivers.
[r] Great Basin in California except Truckee and Carson river basins.
[s] Below junction with Gila.
[t] Rogue, Umpqua, and Siletz rivers only.

DIVISION OF GROUND WATERS.

SCOPE OF WORK.

The work of the division of ground waters comprises investigations of the occurrence and quality of waters below the surface of the ground and of methods of recovering and utilizing such waters. Most of the work has been done in the arid and semiarid States of the West, where interest in irrigation with ground water is great and where prospects for considerable increase in areas thus irrigated are favorable.

Nearly 40 investigations of ground water or quality of water (including the reports in press) were in progress in the course of the year, covering areas in Alaska, Arizona, California, Connecticut, Mississippi, Montana, Nebraska, Nevada, New Mexico, South Carolina, South Dakota, Texas, Utah, Washington, and Wyoming. Of these investigations six were conducted in cooperation with the geologic branch of this Survey, one was made for the War Department, one for the Department of Justice, one for the United States Indian Office, and 19 were made in cooperation with State organizations, including two geological and natural history surveys, two departments of engineering, two experiment stations, one agricultural college, and one board of health.

During the year the division suffered a severe loss in the death of R. B. Dole, whose thorough and extensive work on the quality of the natural waters of the United States during his 14 years of service on the Geological Survey constitutes an eminent contribution to science and a production of great economic value to the entire country. The comprehensive paper which he was preparing on the chemical composition of the surface waters of the United States remains unfinished, but it is to be completed by other workers and eventually to be published as a professional paper. A. A. Chambers has been placed in charge of the investigations of the quality of water.

In connection with preparations for war a comprehensive digest of information relating to the water supplies available for use at military camps near the border of the United States, except the Canadian border, was prepared in cooperation with the section of Coastal Plain investigations of the geologic branch and was submitted to the War Department.

A bibliography of the publications of the United States Geological Survey relating to ground water, with brief abstracts, detailed index, and map, was prepared by O. E. Meinzer and is to be published as a water-supply paper. Work was also begun by Mr. Meinzer on a comprehensive treatise on ground water and on an elaborate report on the geology and water resources of the desert valleys of the western United States.

A paper entitled "The divining rod, a history of water witching, with a bibliography," by A. J. Ellis, was published as Water-Supply Paper 416. The chapter on the production of mineral waters for the annual volume, Mineral Resources of the United States, also was prepared by Mr. Ellis.

The analytical work in connection with studies of oceanography, begun in a previous year, was continued by A. A. Chambers. A brief report was prepared by Mr. Chambers on the mineral waters of the United States as compared with those formerly imported from Europe. A paper on the classification of springs was prepared by Kirk Bryan and will be published as part of the "Contributions to hydrology."

As in previous years the maps and manuscripts for geologic folios were reviewed so far as they relate to ground water.

Meetings of the Ground-Water Club for professional study and discussion were held biweekly during the winter and spring.

WORK BY STATES.

Alaska.—The report on the mineral springs of Alaska, by G. A. Waring, with a chapter on the quality of the water by R. B. Dole and A. A. Chambers, was submitted for publication as Water-Supply Paper 418. Analyses of Alaska surface waters have also been made by Mr. Chambers, and a report on these is in preparation.

Arizona.—The report on "The Navajo country, a geographic and hydrographic reconnaissance of parts of Arizona, New Mexico, and Utah," by H. E. Gregory, was published as Water-Supply Paper 380. A brief report on ground water in an area west of Little Colorado River is being prepared by Prof. Gregory. Both reports are based on investigations made in previous years through financial cooperation by the Office of Indian Affairs.

A report by A. T. Schwennesen on the artesian and other ground waters in San Simon Valley, with special reference to their use for irrigation, was published as Water-Supply Paper 425–A. A comprehensive report on ground water in San Bernardino and San Simon valleys and in Gila Valley above San Carlos is being prepared. Through cooperation with the Arizona Agricultural Experiment Station the water analyses in connection with these investigations were made by A. E. Vinson, of the experiment station staff.

Near the end of the fiscal year plans were made for a comprehensive survey of desert watering places and conditions affecting the occurrence of ground water in that part of Arizona lying west of Tucson and south of Phoenix and Parker. Kirk Bryan and C. P. Ross were assigned to this project.

California.—The report on ground water in the San Jacinto and Temecula basins, Cal., was completed by G. A. Waring and is to be published as a water-supply paper.

A detailed report on the ground water in the part of San Diego County lying west of the divide, by A. J. Ellis and C. H. Lee, was nearly completed. The analytical work for this investigation was done by S. C. Dinsmore. Financial cooperation was furnished by the city of San Diego.

Some work was done on the final report on Sacramento Valley by Kirk Bryan, but the completion of this paper was delayed through the author's duties in connection with Yale University.

A report on ground water in the Morgan Hill area of Santa Clara Valley, by W. O. Clark, was completed and published as Water-Supply Paper 400–E. The final report on the entire Santa Clara Valley was nearly completed by the end of the fiscal year.

Brief investigations of ground water in Mohave Valley and in Ivanpah, Mesquite, and Pahrump valleys were made by G. A. Waring, who practically completed his reports on all these valleys. The analytical work in connection with these investigations was done by S. C. Dinsmore.

An investigation of Salinas Valley was begun by W. O. Clark, and at the end of the fiscal year most of the field work in this area was completed.

Near the end of the year plans were made for a detailed survey of desert watering places and ground-water resources of parts of southeastern California, including Imperial Valley, Colorado Desert, Mohave Desert, and Death Valley. Field work in this region was assigned to D. G. Thompson and J. S. Brown.

Since 1900 measurements of depth to water level in a series of wells in southern California have been made at intervals, for the purpose of obtaining a record through many years of the relation between the contributions to the underground reservoirs in the rainy seasons and the withdrawals from them in the dry seasons, when ground water is pumped for irrigation and is withdrawn in large quantities by evaporation and transpiration. As in the preceding year, these measurements were made by F. C. Ebert.

All the ground-water work in California is done in financial cooperation with the State department of engineering.

Connecticut.—Observations in connection with an investigation of the relations between precipitation, ground-water storage, evaporation, run-off, and quality of water in the Pomperaug Valley, begun in July, 1913, by A. J. Ellis, were continued during the year, and some work was done in compiling the results.

Reports, which will be published as water-supply papers, were also practically completed for the Meriden area, the Southington-Granby area, the Glastonbury area, the Norwalk area, and the Suffield area. The Meriden report is by G. A. Waring; the others by H. S. Palmer. A total of 127 samples of water from the Meriden and Southington-Granby areas were analyzed by Messrs. Dinsmore and Chambers.

All the work in Connecticut was done in cooperation with the State Geological and Natural History Survey and was supervised by H. E. Gregory.

Mississippi.—The investigation of ground water in Mississippi, which was begun in a previous year, was continued in cooperation with the section of Coastal Plain investigations of the geologic branch. (See p. 64.)

A chapter on the water in the Eocene formations was prepared by Mr. Waring, and considerable work was done on a study of the quality of water in the State by Mr. Chambers.

Montana.—The investigation of ground water in Montana, begun in August, 1915, was continued by A. J. Ellis, who nearly completed a report on the entire area south of Yellowstone River. This investigation is carried on in cooperation with State organizations. The chemical analyses are made at the laboratory of the State board of health and the Montana State College, under the supervision of W. M. Cobleigh, director of the laboratory, and records of wells are collected throughout the State by A. W. Mahon, State engineer, in cooperation with W. A. Lamb, district engineer of the United States Geological Survey.

A report by O. E. Meinzer on artesian water in Little Bitterroot Valley, with special reference to its use for irrigation, was published as Water-Supply Paper 400–B. The report contains 10 analyses, made in the laboratory of the State board of health and Montana State College, of water from this valley.

Nebraska.—A report on the ground-water supplies available for irrigation in Lodgepole Valley, Nebr., was prepared by O. E. Meinzer and submitted for publication as Water-Supply Paper 425–B. This paper includes also a section on the cost of pumping for irrigation in western Nebraska, by H. C. Diesem, of the Office of Public Roads and Rural Engineering, Department of Agriculture.

Nevada.—The final report on ground water in Big Smoky, Clayton, and Alkali Spring valleys, by O. E. Meinzer, was published as Water-Supply Paper 423. The water-level measurements begun in 1913 were continued during the year by F. J. Jones.

The investigation of ground water on the Truckee-Carson irrigation project, to determine the cause of the rise of the water levels in

Big Soda and Little Soda lakes, by C. H. Lee and W. O. Clark, was completed, and a report thereon was submitted to the Department of Justice.

An investigation of the ground-water resources of Reese River valley and an adjacent part of Humboldt River valley was made by G. A. Waring, who prepared a report on the area to be published as a part of Water-Supply Paper 425. The area examined by Mr. Waring in Ivanpah, Mesquite, and Pahrump valleys also lies in part in the State of Nevada. Water analyses for both areas were made for the Geological Survey by S. C. Dinsmore at Reno, Nev.

New Mexico.—A report on ground water in the Animas, Playas, Hachita, and San Luis basins, in Grant County, N. Mex., completed by A. T. Schwennesen in the preceding fiscal year, is to be issued as Water-Supply Paper 422. Analyses of water samples and of the water-soluble contents of soil samples from these basins were made by R. F. Hare through cooperation with the New Mexico Agricultural Experiment Station.

The Navajo country, which was investigated by H. E. Gregory, and San Simon Valley, which was investigated by A. T. Schwennesen, lie partly in New Mexico but more largely in Arizona. Reports on both areas were published during the fiscal year.

An investigation to determine the changes produced in the artesian basin in Pecos Valley through developments since 1906, when a preliminary report on the geology and underground waters of the Roswell artesian area by C. A. Fisher (Water-Supply Paper 158) was published, and to devise means for ascertaining and preventing the underground losses of artesian water was made by O. E. Meinzer, who spent about ten days in the field and submitted a manuscript report to the land-classification board.

South Carolina.—Near the end of the fiscal year a survey of the ground-water resources of the Coastal Plain province of South Carolina (see p. 74) was begun in cooperation with the section of Coastal Plain investigations of the geologic branch. Water samples collected in connection with this investigation are being sent to the new water laboratory of the Geological Survey to be analyzed under the direction of Mr. Chambers.

South Dakota.—A report on artesian water in the vicinity of the Black Hills, S. Dak., prepared in the preceding fiscal year by N. H. Darton, is still awaiting publication. This report is a revision of earlier reports on the area by Mr. Darton and includes much new material.

Texas.—The work in Texas was done in cooperation with the section of Coastal Plain investigations of the geologic branch. Work was continued in the part of the Texas Coastal Plain not covered

by Water-Supply Paper 335 (Geology and underground waters of the southeastern part of the Texas Coastal Plain, by Alexander Deussen), and a comprehensive paper on this area is being prepared.

Utah.—A rapid examination of parts of western Utah was made by G. A. Waring for the purpose of obtaining information for the classification of lands under the enlarged-homestead act. A manuscript report was submitted by Mr. Waring to the land-classification board.

Washington.—Ground-water conditions in Quincy Valley, Wash., including the Moses Lake region, were investigated in the fall of 1916 by A. T. Schwennesen, who prepared a report on the area which will be published as Water-Supply Paper 425–E. This investigation is important because of the need for water to irrigate orchard lands. Twenty samples of water from the area were analyzed by S. C. Dinsmore.

Wyoming.—A report on ground water for irrigation in Lodgepole Valley, which lies partly in Wyoming and partly in Nebraska, was prepared by O. E. Meinzer and is now in press as Water-Supply Paper 425–B.

DIVISION OF WATER UTILIZATION.

The organization of the division of water utilization was continued during the year essentially as described in previous annual reports, except that the force was increased by the transfer from the Salt Lake office of W. E. Dickinson. E. C. La Rue, to whom Mr. Dickinson was assigned as an assistant, and E. C. Murphy, hydraulic engineer, have done the greater part of the field work involved in the examination of water-power withdrawals, rights of way, and Carey Act segregations. Mr. La Rue completed his report on enlarged-homestead petitions near Utah Lake and in the last part of August established headquarters at Portland, Oreg., from which he engaged in office and field examination of lands that will revert to the United States from the grant to the California-Oregon Railroad Co. In connection with this work, Mr. La Rue has submitted a report on the Rogue River basin and begun the preparation of reports on the basins of Willamette and Big Sandy rivers and coast streams. These reports are being prepared for the purpose of determining the value of streams on the railroad-grant lands for the development of power.

Mr. Murphy completed his report on water-power sites in New Mexico and then began an investigation of enlarged-homestead petitions in Montana. During the year he examined lands in the basins of Teton, Marias, Missouri, Sun, Dearborn, and Boulder rivers, and Whitetail and Clancy creeks, along Musselshell River, in the Musselshell irrigation district, in the basin of American Fork, on the Winnett irrigation project, and on the Flat Willow project.

Reports containing the results of work of the division of water utilization published during the year include Water-Supply Papers 395, 396, 417, 419, 420, and 421. Titles and brief summaries of these publications are given on pages 28 and 30.

DIVISION OF ENLARGED AND STOCK-RAISING HOMESTEADS.

The funds for the administration of the stock-raising homestead law became available June 12 on the approval of the sundry civil appropriation act, which also provided specifically for the cost of classifying enlarged-homestead lands, an expense that had previously been borne by the general appropriation for investigations of water resources. E. C. Murphy, hydraulic engineer, who had been examining enlarged-homestead lands in Montana, was immediately assigned to field work in Montana under the new law and was still engaged in that work at the end of the fiscal year.

In anticipation of the urgent necessity for a large number of men for field service in classifying lands under the new law, the Civil Service Commission had given a special examination and established a small list of eligibles. Work on the organization of field parties was in progress June 30, but no field work had been done.

LAND-CLASSIFICATION BOARD.

ORGANIZATION AND PERSONNEL.

The land-classification board consists of a division of mineral classification, the work of which pertains to lands valuable for coal, oil, phosphate, and various other minerals, and a division of hydrographic classification, the work of which pertains to irrigation, dry farming, stock raising, and water power. Technical men from other branches of the Survey act in consultation on matters involving important classification. The organization and personnel for the year were as follows:

Chief of branch: W. C. Mendenhall, geologist.

Secretary of the board: Elsie Patterson.

Division of mineral classification: A. R. Schultz, geologist; E. R. Lloyd and E. H. Finch, associate geologists; W. B. Emery, R. W. Howell, and H. S. Palmer, assistant geologists; Howard Clark, junior topographer.

Division of hydrographic classification: Herman Stabler, hydraulic engineer; W. B. Heroy, geologist; R. W. Davenport and R. M. Davis, assistant engineers; W. N. White, assistant classifier; J. F. Deeds, J. G. Mathers, and M. A. Sanchez, junior engineers; C. E. Nordeen, junior topographer.

The permanent force of the board at the end of the year included 6 geologists, 8 engineers, 4 draftsmen, and 24 employees in other grades, a total of 42 persons. There were 15 additions to and 10 separations from the force during the year.

FUNDS.

The allotments from the different appropriations amounted for the year 1917 to $57,120 and were distributed among the general appropriations as follows:

Geologic surveys	$29,720
Topographic and forest surveys	11,500
Gaging streams	11,000
Salaries of scientific assistants and skilled labor	4,900
	57,120

SUMMARY OF WORK OF CLASSIFICATION.

During the year 1,321,989 acres of lands were classified as to their coal character. Of this amount 951,540 acres were classified as non-coal land and 370,449 as coal land. Coal-land withdrawals during the year amounted to 553,233 acres, and coal-land restorations to 1,635,446 acres. The area withdrawn for classification as to coal at the close of the year was 44,853,741 acres.

New withdrawals of probable oil lands amounting to 903,791 acres were made during the year, and areas aggregating 176,311 acres were restored because examination determined that the lands were not favorable for the accumulation of oil. The result of the year's work, therefore, has been an increase of the area of oil reserves from 5,621,160 to 6,348,640 acres. Indian lands to the amount of 42,097 acres were classified as oil lands.

The classification of 2,530,309 acres of land as mineral land because they contain shales from which, it is believed, great quantities of petroleum and by-products may be distilled brings the total area of lands so classified up to 3,992,036 acres. Naval reserves of such oil-shale land aggregating 132,024 acres were established during the year.

Phosphate reserves were decreased by 80 acres during the year, the area withdrawn on June 30, 1917, being 2,506,398 acres.

During the year the Secretary, on the recommendation of the Geological Survey, designated 13,133,851 acres of land as nonirrigable under the enlarged-homestead acts. The designations of 112,807 acres, which were found to have been erroneously designated, were canceled, the result being a net increase in this classification of lands of a little more than 13,000,000 acres during the year. At the end of the year 275,633,861 acres were classified as being not susceptible of irrigation. The number of petitions for such designation available for action during the year was 16,077, of which 8,868 were acted upon; 7,209 were awaiting action at the end of the year.

Withdrawals of lands believed to be available for power sites aggregated 156,353 acres, and restorations of lands previously with-

drawn but found to be without value for power amounted to 79,908 acres. The increase of outstanding withdrawals from 2,352,652 to 2,429,097 acres was the net result of these actions. In pursuance of the enabling act 764,438 acres in Arizona and 201,000 acres in New Mexico were designated as valuable for water power, and 31,765 acres of Oregon & California Railroad grant lands in Oregon were classified as power-site lands.

During the year areas amounting to 11,934 acres were withdrawn as public water reserves and 3,498 acres were eliminated from such reserves. The net increase in lands withdrawn as public watering places was from 193,272 to 201,708 acres.

CORRESPONDENCE.

During the year 25,721 letters were referred to the land-classification board. In addition, some 4,900 copies of correspondence from various bureaus were sent to the board for its information and files. This material is made up largely of copies of General Land Office letters to registers and receivers of local land offices, of reports made by agents of the General Land Office, and of copies of departmental decisions. In the same period 15,362 letters, reports, acknowledgments, and notifications were prepared in the board. For the working days of the year these figures show a daily average of about 85 for the incoming and 51 for the outgoing mail.

PUBLICATIONS.

Bulletin 623, entitled "Petroleum withdrawals and restorations affecting the public domain," was made available to the public in June, 1916. The demand for this report was so large that the entire edition was exhausted in less than four months, and a reprint was ordered in October, 1916. At the same time an appendix to the first edition of this bulletin was printed, covering all the oil withdrawals and restorations made from January 15 to September 30, 1916. A copy of this appendix was mailed to each person who had received a copy of Bulletin 623. The reprint of this bulletin, which includes the appendix, gives true copies of all petroleum withdrawals and restorations, contains chapters on the purpose and history of withdrawals, oil-land law, and orders and correspondence, and is illustrated by nine State maps showing all lands included in withdrawals on September 30, 1916. Additional withdrawals and restorations have been made in some of the States since that date, and lists have been published in Press Bulletin 321 and in a multigraphed circular. It is planned to make future similar actions available to the public in the same manner and by the issue of revised reprints or appendixes to Bulletin 623.

COOPERATION WITH THE GENERAL LAND OFFICE.

The cooperation between the General Land Office and the Geological Survey, by which the Survey's information on the mineral and power value of lands sought under the public-land laws is made available to the department through the Land Office, was continued along the same lines as in 1915–16. The Survey received during the year 3,067 requests from the General Land Office for information as to the mineral character or the relation to water supply of public lands sought, and it furnished such information in 3,651 cases. It also received for consideration 1,372 reports of field examinations by the General Land Office and acted on 1,314 reports of this character.

At the beginning of the year more than 2,000 cases involving the mineral character of lands were pending, and at the end of the year the number was about 500 less. The cases acted upon involving both mineral character and water resources also outnumber the cases received, and the pending cases of this class at the end of the year were about 700 less in number than at the beginning. The total number of cases covered by the cooperative agreement with the General Land Office pending at the end of the year is 1,585, approximately 500 less than at the beginning of the year. Of the pending cases, 486 are concerned only with the mineral character of the land, 24 only with the water resources, and 1,075 with both mineral character and water resources.

During the year numerous applications for classification of lands included in withdrawals were received. A number of requests were sent to the Survey for the reclassification of lands as to mineral or power-site possibilities, and a large number of applications of other types were referred for consideration and report. These are considered in more detail in the sections on hydrographic and mineral classifications.

The following table shows the year's record in the several classes of cooperative cases, including those discussed above and including also requests for the designation of lands under the enlarged-homestead and stock-raising homestead acts and other miscellaneous cases:

General summary of cooperative cases, fiscal year 1916–17.

Class.	Pending July 1, 1916.	Received.	Disposed of.	Pending June 30, 1917.	Gain or loss.
Mineral character only:					
General Land Office requests for information	90	425	455	60	+ 30
General Land Office field-service reports	199	949	722	426	− 227
Applications for classification as to mineral	18	76	56	38	− 20
	307	1,450	1,233	524	− 217
Water resources only:					
General Land Office requests for information	30	22	46	6	+ 24
General Land Office field-service reports	20	24	26	18	+ 2
Cases in national forests	1	24	19	6	− 5
Applications for reclassification as to water resources	12	78	72	18	− 6
Applications for rights of way	98	321	347	72	+ 26
Lists under Carey Act	1	4	5	0	+ 1
Desert-land proofs under irrigation projects	51	87	72	66	− 15
Petitions under enlarged-homestead acts	7,038	9,039	8,868	7,209	− 171
Applications under stock-raising homestead act	1	3,036	34	3,002	−3,002
	7,251	12,635	9,489	10,397	−3,146
Mineral character and water resources:					
General Land Office requests for information	1,465	2,513	2,997	981	+ 484
General Land Office field service reports	194	292	413	73	+ 121
General Land Office requests for information as to water resources, accompanied by field-service reports as to mineral character	67	107	153	21	+ 46
Indian Office requests for information	20	33	45	8	+ 12
	1,746	2,945	3,608	1,083	+ 663
Grand total	9,304	17,030	14,330	12,004	−2,700

MINERAL CLASSIFICATION.

COAL.

Regulations.—The only change that has been made in the regulations governing the classification and valuation of coal lands since their adoption in 1913 occurs in the last part of paragraph 2, which was revoked by a decision of Secretary Lane on February 16, 1915 (43 L. D., 520), the department holding that legally classification of coal land must be made by quarter quarter sections and surveyed lots and not by minor subdivisions of 2½ or 10 acres. Administration under these regulations has proved the soundness of the principles underlying them, and they furnish what is believed to be a just and reasonable standard for the disposition of public land underlain by coal of any quality or thickness.

Withdrawals and restorations.—The total area of coal-land withdrawals made during the year was 553,233 acres, approximately 84,000 acres less than last year. These withdrawals for the most part affect lands in Arizona not previously known to contain coal and land in Montana within the former Fort Peck Indian Reservation, which had been previously classified as coal land at the minimum price but which were withdrawn pending legislation and later in the year restored to entry at the former coal values. In New Mexico

certain coal lands within the Navajo Indian Reservation that have been reconveyed by the Atchison, Topeka & Santa Fe Railway Co. to the United States Government were withdrawn pending examination and appraisal. Coal lands not hitherto known have been discovered in Arizona, New Mexico, Montana, and Washington and have been withdrawn by Executive order pending detailed examination. Like other recent years, the year has shown a substantial decrease in the area of land included in outstanding withdrawals of coal lands, because, although over 500,000 acres of land has been withdrawn during the year, a much larger area, more than 1,635,000 acres, has been restored as rapidly as field work and classifications have been completed, and the restorations thus effected during the year exceed the withdrawals by more than 1,000,000 acres.

Coal withdrawals and restorations, fiscal year 1916–17, in acres.

State.	Outstanding July 1, 1916.	New withdrawals, 1916–17.	Restorations, 1916–17.	Withdrawals outstanding June 30, 1917.
Arizona	118,718	67,197	43,970	141,945
California	17,643	.....	.....	17,643
Colorado	4,622,749	.....	119,332	4,503,417
Idaho	338,452	.....	.....	338,452
Montana	11,131,717	464,780	683,928	10,912,569
Nevada	83,833	.....	.....	83,833
New Mexico	5,709,760	20,616	126,482	5,603,894
North Dakota	14,857,342	.....	200,887	14,656,455
Oregon	4,361	.....	.....	4,361
Utah	5,426,730	.....	100,474	5,326,256
Washington	847,255	640	20,702	827,193
Wyoming	2,777,394	.....	339,671	2,437,723
	45,935,954	553,233	1,635,446	44,853,741

Classification.—Examinations made for coal-land classification have resulted in eliminating from withdrawal large areas of noncoal land in Montana, Wyoming, North Dakota, New Mexico, and Colorado and smaller areas in other States, thus continuing the policy of examining and eliminating from withdrawal as rapidly as possible areas of doubtful coal value. In Arizona certain lands within Indian reservations included in former coal withdrawals were restored in order to clear the records.

During the fiscal year more than 370,000 acres have been classified as coal land and more than 951,000 acres as noncoal land, a total classification of 1,321,989 acres. This is considerably less than the results of either of the preceding two years and far below those attained annually prior to that time. The decrease in classified areas within the last three years is due partly to the elimination of the larger noncoal areas from withdrawal and the consequent restriction of field examinations to a detailed study of known coal fields and

partly to a decrease in allotments for coal-land examination on account of increased demands for the examination of other mineral deposits.

In the first of the following tables the classifications made during the year are summarized by States. In the same table the classifications are divided into two groups—reclassifications, which constitute a revision of previous classifications, and new classifications, which comprise the classification of withdrawn areas or areas not previously considered. The sum of these two groups is the total classification. The net increase or decrease in total areas classified in any State, as shown in the last two columns, is obtained directly from the other columns of the table.

Lands classified as coal and noncoal land, fiscal year 1916–17, in acres.

State.	Total classification.			Reclassification.		New classification.		Net increase or decrease in areas classified.	
	Coal.	Noncoal.	Total.	Previous noncoal, now coal.	Previous coal, now noncoal.	Coal.	Noncoal.	Coal.	Noncoal.
Colorado	71,501	105,110	176,611	.....	57,599	71,501	47,511	+ 13,902	+105,110
Montana	73,994	231,742	305,736	52,939	12,807	21,055	218,935	+ 61,187	+178,803
New Mexico	14,109	181,561	195,670	1,962	67,226	12,147	114,335	− 53,117	+179,599
North Dakota	201,427	70	201,497	540	70	200,887	.....	+201,357	− 470
Oregon	.....	40	40	.....	40	.....	.....	− 40	+ 40
Utah	8,938	72,758	81,696	.....	30	8,938	72,728	+ 8,908	+ 72,758
Washington	320	20,228	20,548	.....	.....	320	20,228	+ 320	+ 20,228
Wyoming	160	340,031	340,191	.....	520	160	339,511	− 360	+340,031
	370,449	951,540	1,321,989	55,441	138,292	315,008	813,248	+232,157	+896,099

Classifications of coal and noncoal land, June 30, 1917, in acres.

State.	Classification outstanding July 1, 1916.		Net result of classification, 1916–17.		Classification outstanding June 30, 1917.		
	Coal.	Noncoal.	Coal.	Noncoal.	Coal.	Noncoal.	Total.
Arizona	.....	42,492	.....	.....	.....	42,492	42,492
Arkansas	60,715	70,038	.....	.....	60,715	70,038	130,753
California	8,720	228,502	.....	.....	8,720	228,502	237,222
Colorado	3,348,564	9,250,638	+ 13,902	+105,110	3,362,466	9,355,748	12,718,214
Idaho	2,113	7,936,925	.....	.....	2,113	7,936,925	7,939,038
Montana	5,560,135	21,580,236	+ 61,187	+178,803	5,621,322	21,759,039	27,380,361
Nevada	5,880	2,428	.....	.....	5,880	2,428	8,308
New Mexico	728,214	3,554,103	− 53,117	+179,599	675,097	3,733,702	4,408,799
North Dakota	2,174,635	3,181,325	+201,357	− 470	2,375,992	3,180,855	5,556,847
Oregon	17,164	1,062,055	− 40	+ 40	17,124	1,062,095	1,079,219
South Dakota	250,123	6,956,108	.....	.....	250,123	6,956,108	7,206,231
Utah	1,066,663	3,234,333	+ 8,908	+ 72,758	1,075,571	3,307,091	4,382,662
Washington	148,940	1,562,308	− [a] 320	+ 20,228	148,620	1,582,536	1,731,156
Wyoming	7,623,325	14,941,289	− 360	+340,031	7,622,965	15,281,320	22,904,285
	20,995,191	73,602,780	231,517	+896,099	21,226,708	74,498,879	95,725,587

[a] 640 acres not priced, rewithdrawn; 320 acres coal priced; net, −320 acres.

Area and valuation of coal lands June 30, 1917.

State.	Appraised coal land July 1, 1916.	Coal land appraised 1916–17.		Net result of appraisals, 1916–17.	Total appraised coal land outstanding June 30, 1917.	Total valuation of appraised coal land outstanding June 30, 1917.	Average value per acre.
		Total coal land appraised.	Coal land reclassified as noncoal land and rewithdrawn.				
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*		
Arkansas	60,715	.....	.....	.....	60,715	$1,473,762	$24.20
California	7,720	.....	.....	.....	7,720	585,086	75.70
Colorado	2,863,585	71,501	57,599	+ 13,902	2,877,487	195,091,022	67.80
Idaho	2,113	.....	.....	.....	2,113	51,824	24.50
Montana	5,445,592	73,994	12,807	+ 61,187	5,506,779	129,698,998	23.60
Nevada	5,880	.....	.....	.....	5,880	117,600	20.00
New Mexico	710,262	14,109	67,226	− 53,117	657,145	15,682,664	23.90
North Dakota	2,174,635	201,427	70	+201,357	2,375,992	37,623,645	15.80
Oregon	6,915	.....	40	− 40	6,875	121,651	17.70
South Dakota	250,123	.....	.....	.....	250,123	2,758,587	11.00
Utah	1,048,542	8,938	30	+ 8,908	1,057,450	44,325,419	41.90
Washington	740	320	.....	+ 320	1,060	22,400	21.10
Wyoming	7,448,456	160	520	− 360	7,448,096	385,436,687	51.70
	20,025,278	370,449	138,292	232,157	20,257,435	812,989,345	39.90

Applications for classification as to coal.—During the present year the Survey received 44 applications for classification; 37 of these were requests for classification as coal land and 7 as noncoal land. There were also pending at the beginning of the year 12 applications for coal classification and 3 for noncoal. Of the total 59 received and pending cases, 15 were approved—12 as coal and 3 as noncoal—and 13 disapproved—9 as coal and 4 as noncoal. At the end of the year there were pending 31 requests for classification, of which 28 were for coal and 3 for noncoal.

OIL.

Withdrawals and restorations.—The examination and withdrawal of the public lands with reference to their prospective value for deposits of petroleum and natural gas was continued during the year in California, Wyoming, and Montana. The examinations were made for the purpose of reducing the outstanding oil withdrawals in so far as the data indicated that the withdrawn lands were not valuable for oil and of adding new areas to the oil reserves wherever the data indicated the presence of oil. These examinations resulted in eliminating from withdrawal 176,311 acres of nonoil land and added to the withdrawals 903,791 acres of prospective oil land, a net increase of 727,480 acres for the year.

In California more than 104,000 acres in the Salinas Valley, principally in Monterey County but in part in San Luis Obispo County, was restored to entry, field examination by the Survey having shown these lands to be barren of oil. Field work in the Salinas Valley also resulted in the restoration of a little more than 12,000 acres of

land in Monterey County withdrawn a year ago because it was believed to be favorable for oil accumulation but later found to be almost entirely private land. A restoration of 4,695 acres in Orange and Los Angeles counties was made as a result of the decision rendered by the Supreme Court in the Burke case (224 U. S., 669).

In Wyoming an area of a little less than 38,000 acres in the Big Horn Basin was restored to entry during the year, and about 904,000 acres in Wyoming were included in withdrawals. Approximately 10,000 acres of land in the Big Horn Basin has been withdrawn on the basis of detailed field examination and office work. Approximately 27,000 acres were withdrawn in the Hanna Basin, in southern Wyoming, and the remainder of the withdrawn area of about 133,000 acres lies in the Big Muddy and Lost Soldier fields and in the vicinity of Powder River station.

The discovery of oil in the fall of 1915 near the Wyoming-Montana line made it advisable to withdraw certain favorable areas in the northern part of the Big Horn Basin previously known to the Survey but not included in an oil withdrawal. Part of the area so withdrawn was examined, and the examination resulted in restoring more than 37,600 acres of withdrawn land in this part of the State.

The keen interest manifested in the possible occurrence of oil in Montana about a year ago, after the discovery of oil in Elk Basin, near the Montana-Wyoming State line, caused the Survey to recommend the withdrawal of all areas of favorable structure known in this part of the State, in continuance of the departmental policy of holding prospective oil lands until appropriate legislation for their disposition can be enacted. Some of the withdrawn land in this part of Montana was examined by the Survey and found to be barren of oil, and more than 29,900 acres in southern Montana was restored to entry. Other areas in the State, the largest of which was that of the Malta or Bowdoin dome, in the upper Milk River valley, were withdrawn.

Oil withdrawals and restorations, fiscal year 1916–17, in acres.

	Withdrawals outstanding July 1, 1916.	New withdrawals, 1916–17.	Restorations, 1916–17.	Withdrawals outstanding June 30, 1917.
	Acres.	*Acres.*	*Acres.*	*Acres.*
Arizona	230,400			230,400
California	1,365,947		108,718	1,257,229
Colorado	87,474			87,474
Louisiana	467,030			467,030
Montana	641,622	734,432	29,949	1,346,105
North Dakota	84,874			84,894
Utah	1,952,326			1,952,326
Wyoming	791,467	169,359	37,644	923,182
	5,621,160	903,791	176,311	6,348,640

Oil-shale withdrawals.—Of special interest during the year was the creation of two naval oil-shale reserves, one of 45,440 acres in Colorado and one of 86,584 acres in Utah. Lands included within these reserves are not subject to agricultural or mineral entry and in that respect differ from the classified oil-shale land.

Classification.—Most of the lands examined and included in oil withdrawals have not definitely been classified as oil lands, and no classification of oil lands outside of Indian reservations was made during the fiscal year. The lands on which oil is known or believed to be present in commercial quantities have been included in oil withdrawals pending further detailed examinations, in order to determine the mineral character of these lands and to hold the lands until legislation providing for their disposition is enacted. Lands included in oil withdrawals may therefore be considered tentatively as oil lands, although they have not, with the exception of some of the land in California, been so classified. In addition to the classifications that are reported as withdrawals and restorations in the preceding table, a direct classification as oil land of 42,097 acres in the Blackfeet Indian Reservation, Mont., has been made. Examinations of lands in such reservations are frequently made for the information of the Office of Indian Affairs in its administration of Indian lands. Mineral classification of certain oil lands within the Northern Pacific land grant have been reported to the Commissioner of the General Land Office, but these lands are a part of the outstanding oil reserves and are included in the table given above.

The classification of oil-shale land in Utah was continued in 1916, and large areas have been added to the classified mineral lands. Field examination by the Survey during the four seasons of 1913–1916 has shown that the potentiality of the oil shale of this region as a source of petroleum is enormous. There is also locked up in these shales a vast amount of nitrogen which can be recovered as a by-product in the refining of the shale and used in the manufacture of fertilizers, explosives, etc.

Classification of oil-shale land, fiscal year 1916–17, in acres.

State.	Outstanding July 1, 1916, (mineral).	Classified during fiscal year.		Outstanding June 30, 1917.	
		Mineral.	Non-mineral.	Mineral.	Non-mineral.
Colorado	893,418	2,600	.....	896,018	.....
Utah	112,950	2,527,709	[a] 4,744	2,635,915	4,744
Wyoming	460,103	.....	.....	460,103	.....
	1,466,471	2,530,309	4,744	3,992,036	4,744

[a] Reclassification of area previously classified as mineral land.

Applications for classification.—During the year the Survey received 27 applications for classification of withdrawn oil lands as nonoil land. At the beginning of the year there were also pending three applications for classification as to oil, making a total for the year of 30 cases. Six of these were approved and the lands were restored to entry; 18 were disapproved for the reason that the lands were included in an outstanding oil reserve and the data on file indicate that the lands are valuable for deposits of oil, or because no detailed information is available to the Survey to prove that they are nonoil land, and the data submitted by the applicants were rejected because the evidence submitted did not show that the land is nonoil land and could not be used as a basis for nonoil classification. At the end of the year there remained pending six applications.

PHOSPHATE.

Regulations.—There has been no change in the procedure affecting the classification of phosphate lands. Under the regulations defining phosphate lands, adopted by the Survey in 1912 to guide its recommendations for withdrawal and restoration, lands underlain by deposits containing less than 30 per cent of tricalcium phosphate are considered nonmineral lands. Phosphate beds that are from 1 foot to 6 feet or more in thickness and contain 70 per cent or more of tricalcium phosphate are held to depths ranging from zero along the outcrop to the maximum of 5,000 feet in direct ratio to the variation of the thickness of the bed from 1 to 6 feet. For beds containing less than 70 per cent of tricalcium phosphate the depth limit varies from zero to the depth of a 70 per cent bed of any given thickness in direct ratio to the variation in tricalcium phosphate content from 30 to 70 per cent.

Withdrawals and restorations.—During the year, as in previous years, field examination has been made to obtain information regarding the phosphate character of public lands in order that the nonphosphate areas might be eliminated from the phosphate reserves and newly discovered phosphate areas might be included. Phosphate work was carried on in Idaho, Montana, Utah, and Wyoming, but the results of these investigations were not assembled by the end of the year, and no action has been taken. As a result of the work new withdrawals and restorations will be made as soon as the field work is compiled and the data made available. No withdrawals have been made during the year, and only one restoration, including 80 acres in Florida, has been approved.

Phosphate withdrawals and restorations, fiscal year 1916–17, in acres.

State.	Withdrawals outstanding July 1, 1916.	Restorations, 1916–17.	Withdrawals outstanding June 30, 1917.
Florida	119,817	80	119,737
Idaho	966,377	.....	966,377
Montana	119,227	.....	119,227
Utah	302,465	.....	302,465
Wyoming	998,592	.....	998,592
	2,506,478	80	2,506,398

Classifications.—Indian lands, such as those included in the Fort Hall Indian Reservation, Idaho, and in the Shoshone or Wind River Indian Reservation, Wyo., are not public lands, and therefore such lands can not be withdrawn. Examinations of lands in such reservations are frequently made for the information of the Office of Indian Affairs in its administration of them. If these examinations are made for the purpose of determining whether or not the lands contain phosphate, the results are transmitted not as withdrawals or restorations but as classifications either as phosphate or nonphosphate lands. Mineral classifications of certain phosphate lands within the Northern Pacific land grant have been reported to the Commissioner of the General Land Office, but these lands are a part of the outstanding phosphate reserves and are included in the table given above.

In addition, therefore, to the classifications that are reported as withdrawals and restorations in the preceding table, direct classifications of lands in the Fort Hall Indian Reservation, Idaho, and the Wind River Indian Reservation, Wyo., have been made as indicated in the following table:

Phosphate classifications of Indian lands outstanding June 30, 1917, in acres.

State.	Phosphate land.	Nonphosphate land.
Idaho	4,080	17,440
Wyoming	20,576	85,515
	24,656	102,955

Applications for classification.—During the fiscal year the Survey received five applications for classification of withdrawn lands as nonphosphate land. Two of these were approved and the lands restored to entry; two were disapproved because the data on file indicate that the lands are valuable for deposits of phosphate or because no detailed information is available to the Survey, and the evidence submitted by the applicants was not sufficiently definite to be used as

a basis for a nonphosphate classification; and one remained pending at the end of the year.

POTASH.

Field work in search of commercial deposits of potash was continued by the geologic branch of the Survey during the fiscal year, but no new areas were found on the public lands. No new areas were withdrawn, and no changes were made in the two existing potash reserves in California, Searles Lake, and Panamint Valley, aggregating 91,207 acres, or in the potash reserve of 39,422 acres at Columbus Marsh, Nev.

METALLIFEROUS LANDS.

The act of February 26, 1895 (28 Stat., 683), made provision for classifying the lands within the Northern Pacific Railroad grant in certain land districts in Montana and Idaho with respect to their mineral or nonmineral character, the work to be done by commissioners appointed for the purpose. The classifications made in many areas were unsatisfactory, and a reclassification was provided for in the sundry civil act of June 25, 1910 (36 Stat., 739). At the request of the General Land Office the work is being done by the Geological Survey. Field examination of these lands was first undertaken by the Survey during the field season of 1910. The work has been continued during subsequent years, and field examination of all lands thus far listed to the Survey for examination and report has been completed and the classification furnished to the Commissioner of the General Land Office.

Lands in Northern Pacific Railroad grant in Idaho and Montana classified, fiscal years 1911–1917, in acres.

State.	Classification.	1911	1912	1913	1914	1915	1916	1917	Total.
Idaho	Mineral	45,645	19,444	1,000	.....	.....	.....	.....	65,789
	Nonmineral	90,712	53,055	1,200	.....	.....	478	.....	145,445
		136,357	72,199	2,200	.....	.....	478	.....	211,234
Montana	Mineral	130,386	1,134	19,800	480	6,629	.....	.....	158,429
	Nonmineral	21,802	83,981	65,570	7,696	7,911	2,229	160	189,349
		152,188	85,115	85,370	8,176	14,540	2,229	160	347,778
Idaho and Montana	Mineral	176,031	20,278	20,800	480	6,629	.....	.....	224,218
	Nonmineral	112,514	137,036	66,770	7,696	7,911	2,707	160	334,794
		288,545	157,314	87,570	8,176	14,540	2,707	160	559,012

In addition to the above work a supplemental report was furnished to the Secretary of the Interior covering certain manganese areas examined by the Survey in 1915. The entire area included in the Gila Indian Reservation, Ariz., was examined as to the mineral character of the lands in the reservation, but a report has not yet been

furnished to the Commissioner of Indian Affairs, as the chemical work on the mineral specimens collected in the field has not been completed.

Withdrawals.—No new areas were withdrawn and no change was made in the mineral-land withdrawal of 8,507 acres in Arizona.

HYDROGRAPHIC CLASSIFICATION.

WATER POWER.

Withdrawals and restorations.—The classification of the public lands with relation to their value in connection with water-power development was continued during the year, the withdrawals being made under the authority conferred by the two acts of June 25, 1910 (36 Stat., 847; 36 Stat., 855, 858), and the act of August 24, 1912 (37 Stat., 497). On July 1, 1916, the area included in outstanding withdrawals was 2,352,652 acres. During the year 156,353 acres additional were withdrawn, and 79,908 acres previously included in power-site reserves were restored to the public domain. On June 30, 1917, the total area withdrawn in connection with water power was 2,429,097.

Power sites withdrawn, restored to entry, and outstanding, fiscal year 1916–17, in acres.

State.	Withdrawals outstanding July 1, 1916.	New withdrawals, 1916–17.	Restorations, 1916–17.	Withdrawals outstanding June 30, 1917.
Alabama	120			120
Alaska	69,300			69,300
Arkansas	22,354			22,354
Arizona	335,791	27,173	62,640	300,324
California	256,090	8,323	407	264,006
Colorado	273,670	3,124	290	276,504
Idaho	260,745	2,987	1,238	262,494
Michigan	1,240			1,240
Minnesota	12,309			12,309
Montana	171,891	536	8,130	164,297
Nevada	26,153	1,208		27,361
Nebraska	761			761
New Mexico	13,577	49,705	680	62,602
Oregon	261,676	56,406	764	317,318
Utah	451,217	760	4,553	447,424
Washington	108,593	5,427	240	113,780
Wyoming	87,165	704	966	86,903
	2,352,652	156,353	79,908	2,429,097

Water-power designations.—The act of June 20, 1910 (36 Stat., 557), enabling Arizona and New Mexico to enter the Union as States, reserved to the United States all lands actually or prospectively valuable for power sites so far as ascertained and designated by the Secretary of the Interior within five years after the proclamation of the President declaring admission of the new States. The five-year period terminated February 14, 1917, for Arizona and January 6, 1917, for New Mexico. No designations were made prior to the cur-

rent fiscal year, though investigations and surveys preliminary to designation had been in progress for several field seasons. Prior to the expiration of the five-year period referred to, however, designations were made covering all lands in the two States believed to be actually or prospectively valuable for power sites, the areas being 764,438 acres in Arizona and 201,000 acres in New Mexico. Such of these lands as were not otherwise withdrawn were also included in power-site reserves under appropriate acts of Congress.

The act of June 9, 1916 (39 Stat., 218), revesting in the United States title to lands held by the Oregon & California Railroad Co., provides for the classification as "power-site lands" of the revested lands found to be chiefly valuable for water-power sites. During the fiscal year 31,765 acres of power-site lands in Oregon were classified under this act, and such of them as were not otherwise withdrawn were included in power-site reserves under appropriate acts of Congress.

Applications for reclassification.—At the beginning of the fiscal year 12 applications for the reclassification of lands included in power-site reserves were awaiting action, and during the year 78 were received, making a total of 90 cases. Action was taken on 72 cases, leaving 18 pending at the end of the year.

Right of way applications.—Departmental regulations of January 6, 1913, under the act of Congress approved March 4, 1911 (36 Stat., 1235, 1253), and of March 1, 1913, under the act of Congress approved February 15, 1901 (31 Stat., 790), charge the Geological Survey with important administrative duties in connection with applications for rights of way over the public lands for purposes related to the development of water power. Such applications, when received in proper form at the General Land Office, are forwarded to the Survey for consideration of such matters as relative priority of applications, incompatibility of works, relative beneficial utilization of resources, and the engineering and economic features involved in the applications and permits. If the approval of an application is found to be compatible with the public interest, a draft of agreement is prepared, and a report is made to the Secretary of the Interior on the circumstances in the case. This agreement, after execution by the applicant and issuance of the permit by the Secretary of the Interior, defines the conditions under which the power is to be developed, the tenure of the site, and the provisions for the protection of the public interest as regards distribution of output, rates, and service.

During the year favorable reports were rendered on 14 applications for permit under the act of February 15, 1901, involving the development of 4,223 continuous horsepower and the construction of 194 miles of transmission lines. Favorable reports were also ren-

dered on five applications for grants under the act of March 4, 1911, for right of way for 49 miles of transmission line.

In pursuance of the Secretary's instructions of August 24, 1916, 26 permittees under the act of February 15, 1901, and grantees under the act of March 4, 1911, were called on for reports of their operations during the calendar year 1916. The reports received show that public lands under permit or grant from the Secretary of the Interior were used during the year for the generation or transmission of about 1,200,000,000 kilowatt-hours of electric energy, the equivalent of 156,000 continuous horsepower.

In addition to applications for rights of way for hydroelectric development, a large number of applications of other types are referred to the Geological Survey for consideration and report. These embrace applications for rights of way for railroads, under the acts of March 3, 1875 (18 Stat., 482), and March 2, 1899 (30 Stat., 990), affecting public lands and Indian reservations, respectively, on which report is made as to whether or not the construction of the railroad will interfere with power or irrigation development on streams in the vicinity of the right of way; applications for rights of way for irrigation uses, under the act of March 3, 1891 (26 Stat., 1095), on which report is made as to interference with power development, the feasibility of the project, and other features; applications for rights of way across national forests for mining, milling, and municipal purposes, under the act of February 1, 1905 (33 Stat., 628); and a variety of miscellaneous applications for domestic, municipal, mining, and railroad water supply.

Applications for rights of way, fiscal year 1916–17.

Class.	Pending July 1, 1916.	Received 1916–17.	Acted on 1916–17.	Pending June 30, 1917.
Railroad: Acts of Congress approved Mar. 3, 1875 (18 Stat., 482), May 13, 1898 (30 Stat., 409), Mar. 2, 1899 (30 Stat., 990), etc.	28	69	77	20
Irrigation: Acts of Congress approved Mar. 3, 1891 (26 Stat., 1095), and May 11, 1898 (30 Stat., 404), etc.	24	119	127	16
Power: Acts of Congress approved Feb. 15, 1901 (31 Stat., 790), Mar. 4, 1911 (36 Stat., 1235, 1253), etc.	33	25	29	29
Miscellaneous: Acts of Congress approved Jan. 21, 1895 (28 Stat., 635), May 21, 1896 (29 Stat., 127), Jan. 13, 1897 (29 Stat., 404), May 11, 1898 (30 Stat., 404), Feb. 15, 1901 (31 Stat., 790), Feb. 1, 1905 (33 Stat., 628), Mar. 4, 1911 (36 Stat., 1235, 1253), etc.	13	108	114	7
Total number of applications for original consideration	98	321	347	72
Additional applications for reconsideration	36	22	37	21

IRRIGATION.

Reservoir withdrawals.—A number of reservoir sites, valuable principally for the storage of water for irrigation, have been examined by the Geological Survey, and, on its recommendation, the

lands they include have been withdrawn from entry. There was no change in the status of such withdrawals during the fiscal year. The following table shows the area of such withdrawals outstanding:

Reservoir sites outstanding June 30, 1917.

	Acres.
Arizona	23,040
Montana	9,080
North Dakota	1,569
Oregon	10,619
Washington	35 943
	80,251

Carey Act segregations.—During the year four proposed segregation lists under the Carey Act were received for report as to available water supply, general feasibility of plan of reclamation, and mineral character of the lands. One such list was pending report on July 1, 1916. Reports on all these lists had been submitted before the end of the year, and supplemental reports on five other lists were also furnished.

Irrigation projects.—The Geological Survey, by instructions of the Secretary of the Interior dated March 15, 1913, furnishes to the Commissioner of the General Land Office information relative to the available water supply and the feasibility of irrigation projects whose water rights or shares are presented as evidence of compliance with the requirements of the desert-land act. During the year 87 such cases were received, and 51 were carried over from the preceding year. Of these 138 cases 72 were reported on and 66 were pending June 30, 1917. Supplemental reports were rendered on 10 cases.

ENLARGED HOMESTEADS.

Classification of lands under the enlarged-homestead acts of February 19, 1909 (35 Stat., 639), June 17, 1910 (36 Stat., 531), June 13, 1912 (37 Stat., 132), March 3, 1915 (38 Stat., 953), and March 4, 1915 (38 Stat., 1162), was continued during the year. These acts are now applicable to 14 States. As a result of the investigations of surface and underground water conditions, designations during the fiscal year have added a large area of land to that previously classified.

Enlarged-homestead designations, fiscal year 1916–17, in acres.

State.	Outstanding July 1, 1916.	Designations 1916–17.	Cancellations 1916–17.	Outstanding June 30, 1917.
Arizona	25,125,355	213,692	.....	25,339,047
California	4,875,197	2,337,251	.....	7,212,448
Colorado	26,026,922	947,321	13,750	26,960,493
Idaho:				
Sections 1–5 only	9,754,609	290,901	2,833	10,042,677
Section 6	124,828	2,873	2,792	124,909
	9,879,437	293,774	5,625	10,167,586
Kansas	372,684	95,455	.....	468,139
Montana	48,502,807	1,018,116	678	49,520,245
Nevada	46,305,197	.....	3,445	46,301,752
New Mexico	25,468,032	3,299,319	18,895	28,748,456
North Dakota	9,560,710	1,934,493	.....	11,495,203
Oregon	17,874,712	122,082	.....	17,996,794
South Dakota	14,426,192	1,059,797	.....	15,485,989
Utah:				
Sections 1–5 only	7,150,736	374,376	38,790	7,486,322
Section 6	1,274,124	68,173	8,928	1,333,369
	8,424,860	442,549	47,718	8,819,691
Washington	5,196,302	250,842	.....	5,447,144
Wyoming	20,574,410	1,119,160	22,696	21,670,874
	262,612,817	13,133,851	112,807	275,633,861

The general provisions of the acts, which apply in all 14 States, permit the entry by one person of 320 acres of "nonmineral, nonirrigable, unreserved, and unappropriated surveyed public lands which do not contain merchantable timber." As a prerequisite to the allowance of such entry, the land must have been designated by the Secretary of the Interior as not being, in his opinion, "susceptible of successful irrigation at a reasonable cost from any known source of water supply." Under the provisions of sections 6 of the acts of February 19, 1909, and June 17, 1910, applicable in Utah and Idaho only, the Secretary may further designate lands which do not have upon them "such a sufficient supply of water suitable for domestic purposes as would make continuous residence upon the lands possible," and entrymen upon such lands are relieved of the necessity of residence. By the act of March 3, 1915 (38 Stat., 956), the enlarged-homestead act was amended so as to permit, under certain conditions, an additional entry, though final proof had already been submitted on the original entry.

A seventh section was added to the enlarged-homestead act of February 19, 1909, by the act of July 3, 1916 (39 Stat., 344), which permits an additional entry for land not contiguous to that originally entered after submission of final proof on the original entry. Under this section residence is required on the additional entry in conformity with the homestead laws except where the additional entry

lies within 20 miles of the original homestead and the prospective entryman still owns and resides upon his original homestead, in which case no residence upon the additional entry will be required. The act applied to all States affected by the general provisions of the enlarged-homestead act except Idaho, but by the act of September 5, 1916 (39 Stat., 724), the act of June 17, 1910, extending the provisions of the enlarged-homestead act to Idaho, was amended by adding thereto a section 7 identical with that added to the 1909 act on July 3, 1916.

Noncontiguous entries under section 6 of the enlarged-homestead act are not permitted under these acts.

The enlarged-homestead acts of February 19, 1909, and June 17, 1910, were further amended by the act of February 20, 1917 (39 Stat., 925), which provides that a homesteader who has received patent to an area of less than a quarter of a section may make entry and obtain title under these two homestead acts, "for such an area of public land as will, when one-half of such area is added to the area of the lands to which he has already obtained title, not exceed one quarter section." Under this act additional entries can be allowed in the cases mentioned without the necessity of the land in the original homestead being designated as subject to entry under the enlarged-homestead act.

Under the act of February 20, 1917 (Public 340), any person who prior to the passage of the act entered under the homestead laws lands included in a ceded Indian reservation and paid therefor a price equivalent to or greater than $4 an acre is entitled to the benefits of the homestead law as if such entry had not been made. The privileges of this act extend only to persons who have submitted final proof on the land previously entered and paid the entire purchase price therefor. Any such person may enter land under the enlarged-homestead act where the proposed additional entry only has been designated as subject to such entry and without the necessity of the ceded Indian lands in the original homestead being designated.

Designations under the enlarged-homestead acts are made either in large, compact areas, as a result of field investigations covering rather large districts, or in small units, as a result of investigations made at the request of prospective entrymen. These requests are referred to as enlarged-homestead petitions. The passage of the act of March 4, 1915 (38 Stat., 1162), which provides that a preference right of entry in the event of designation can be procured by filing an application at the local land office of the district in which the lands are situated, has led to a very large increase in the number of applications received.

Action on petitions under the enlarged-homestead acts, fiscal year 1916–17.

	Pending July 1, 1916.	Received 1916–17.	Action taken, 1916–17.					Pending June 30, 1917.	Cases reconsidered.
			All designated.	Part designated.	Refused.	Recalled.	Total.		
Arizona	112	102	57	10	46	1	114	100	1
California	619	774	945	9	25	27	1,006	387	18
Colorado	997	1,358	984	26	85	37	1,132	1,223	42
Idaho	1,064	656	302	11	20	129	462	1,258	39
Kansas	13	430	401	3	3	1	408	35	17
Montana	1,055	1,664	1,392	79	331	39	1,841	878	252
Nevada	43	14	.....	.....	2	.....	2	55	.....
New Mexico	948	1,104	992	18	151	61	1,222	830	17
North Dakota	78	417	261	12	22	9	304	191	15
Oregon	156	397	32	4	.....	17	53	500	3
South Dakota	445	720	657	36	49	8	750	415	29
Utah	845	338	326	12	149	48	535	648	15
Washington	114	230	115	2	7	.....	124	220	4
Wyoming	549	835	759	22	123	11	915	469	32
	7,038	9,039	7,223	244	1,013	388	8,868	7,209	484

A set of maps of the States affected, showing areas designated under the enlarged-homestead acts and the status of designations on June 30, 1917, has been printed.

STOCK-RAISING HOMESTEADS.

The stock-raising homestead law, approved December 29, 1916 (39 Stat., 862), authorizes the Secretary of the Interior to designate unreserved public lands in any of the public-land States, but not in Alaska, as "stock-raising lands."

The lands to be designated are those whose surface is chiefly valuable for grazing and raising forage crops, which do not contain merchantable timber, are not susceptible of irrigation from any known source of water supply, and are of such character that 640 acres is reasonably required to support a family. The classification of these lands will be made by the Survey on the basis of data now available or to be collected by field parties.

Before June 30 nearly 62,000 applications to enter lands under this act were received in the local land offices, involving about 24,000,000 acres. These applications were distributed by States as follows:

Applications under the stock-raising homestead law, fiscal year 1916–17.

	Number of applications.	Area in acres.		Number of applications.	Area in acres.
Arizona	1,321	559,084.91	North Dakota	700	211,553.93
California	2,567	1,042,238.04	Oklahoma	52	12,528.01
Colorado	5,767	2,205,519.37	Oregon	4,522	1,696,282.88
Idaho	4,398	1,803,447.77	South Dakota	4,182	1,409,471.54
Kansas	80	19,971.89	Utah	1,750	921,631.69
Montana	11,885	3,793,860.66	Washington	830	274,553.61
Nebraska	209	27,200.77	Wyoming	10,106	4,176,367.07
Nevada	150	78,185.47			
New Mexico	13,390	5,730,558.55		61,909	23,962,456.16

Only a small proportion of these cases were transmitted to the Survey during the year.

No appropriation was made for the administration of this law until the last month of the fiscal year, and it was therefore not possible to classify any lands under the act, as field examination will be required in a majority of the cases before classification can be made. Plans were made, however, before the funds became available, for the employment, organization, and equipping of a field force, and considerable work was also done in collecting such information as could be obtained by correspondence with the applicants.

PUBLIC WATER RESERVES.

The litigation before the department over the validity of the withdrawals for public water reserves, which has been prosecuted in the past more or less vigorously, presumably in the interest of large stock owners in various arid parts of the West, has been effectively terminated by section 10 of the stock-raising homestead act of December 29, 1916 (39 Stat., 862). Under this section the creation of public water reserves by Executive order under the act of June 25, 1910 (36 Stat., 847), is expressly recognized as being within the authority then granted to the President.

Immediately after the enactment of the stock-raising homestead law the scope of the investigations undertaken to locate lands principally valuable for stock-watering places, which control grazing privileges on public lands, was greatly enlarged. One of the first steps taken was the making of arrangements with the General Land Office whereby a large number of requests for field examinations have been made in cases covered by the cooperative agreement with that bureau. In addition to data contained in reports submitted in response to these requests, it is expected that the investigations of stock-raising homesteads being made by the Survey will yield a large amount of data during the next year, on the basis of which, it is probable, a large number of water reserves will be created.

At the present time over 900 watering places consisting of springs, creeks, and other sources of water supply have been considered and approximately 850 of these are now included in public water reserves. During the year 11,934 acres have been withdrawn and 3,498 acres have been restored, making a net increase of 8,436 acres in the area withdrawn.

Public water reserves withdrawn from entry and restored to entry, fiscal year 1916–17, in acres.

State.	Withdrawals outstanding July 1, 1916.	New withdrawals, 1916–17.	Restorations, 1916–17.	Withdrawals outstanding June 30, 1917.
Arizona	9,922	2,516	.....	12,438
California	49,846	2,788	160	52,474
Colorado	480	.....	.....	480
Idaho	6,170	1,040	.....	7,210
Montana	1,040	2,264	.....	3,304
Nevada	4,336	.....	.....	4,336
New Mexico	1,440	846	.....	2,286
Oregon	2,500	160	178	2,482
Utah	33,987	.....	160	33,827
Washington	.....	40	.....	40
Wyoming	83,551	2,280	3,000	82,831
	193,272	11,934	3,498	201,708

PUBLICATION BRANCH.

DIVISION OF BOOK PUBLICATION.

SECTION OF TEXTS.

During the year 68,411 pages of manuscript were edited and prepared for printing, and proof sheets for 23,162 final printed pages were read and corrected, this work involving the handling of 5,869 galley proofs and 29,273 page proofs. Indexes were prepared for 73 publications, covering 15,139 pages. A third edition of the pamphlet "Suggestions to authors," by G. M. Wood, editor, and a pamphlet entitled "Extracts from the Style Book of the Government Printing Office," compiled by Mr. Wood, were issued during the year.

At the end of the year eight persons were employed in this section. The water-resources branch has continued to render special assistance in copy preparing and proof reading.

SECTION OF ILLUSTRATIONS.

The number of illustrations prepared was 3,563, comprising 190 maps, 728 photographs prepared for reproduction, 834 diagrams and sections, 1,580 paleontologic drawings and photographs, and 231 miscellaneous illustrations. The illustrations sent to the printer were reproduced by chromolithography, photolithography, the four-color process, halftone engraving, zinc etching, wax engraving, and cuts already engraved, a total of 1,515 subjects. Proofs to the number of 2,087 were examined. Electrotypes of 57 cuts were furnished to outside applicants. At the end of the year material for illustrating 38 reports was in preparation.

DIVISION OF DISTRIBUTION.

The section of distribution, which had previously been a part of the division of book publication, was designated the division of distribution September 1, 1916, with R. C. Shelsé as chief.

Editions of 203 new books and pamphlets, 46 reprinted books and pamphlets, 5 new geologic folios, 14 new geologic maps, 86 new or revised topographic maps, 140 reprinted topographic maps, 9 new photolithographed maps, and 4 reprinted photolithographed maps, making a total of 507 publications, were received during the year. Many other special pamphlets and forms prepared for administrative use were received and distributed.

The total units of all publications received numbered 710,749 books and pamphlets, 21,753 folios, 1,732 geologic maps, 781,644 topographic maps, a grand total of 1,515,878.

The division distributed 607,101 books, 21,235 folios, and 676,526 maps, a total of 1,304,862, of which 29 books, 17,551 folios, and 475,036 maps were sold. The total amount received and deposited in the Treasury as the result of sales of publications was $35,388.79. The sales of topographic and geologic maps amounted to $33,952.84, of topographic and geologic folios to $1,383.30, and of books to $52.65. The division received and answered 104,070 letters.

DIVISION OF MAP EDITING.

SECTION OF GEOLOGIC MAPS.

The publication of the maps and illustrations of folios continued under the direction of George W. Stose, geologist, in charge of this section.

The five folios completed this year are numbered 202 to 206. Of these the Detroit folio covers five quadrangles (Wayne, Detroit, Grosse Pointe, Romulus, and Wyandotte, Mich.), in which there are several large cities with institutions of higher education and many important industries based on natural resources, so that the folio will be of much interest to the community. Three other folios cover two quadrangles each (Eureka Springs and Harrison, Ark.; Leavenworth and Smithville, Mo.-Kans.; Colorado Springs and Manitou, Colo.). In the Colorado Springs folio are described and illustrated Colorado Springs, Manitou, the Garden of the Gods, Monument Park, and Pikes Peak, and this folio will therefore be in large demand by travelers as well as by local residents.

At the end of the fiscal year the maps and illustrations of the Deming (N. Mex.), Colchester-Macomb (Ill.), and Newell (S. Dak.) folios were completed, and the texts were well advanced. The maps of the Herman-Morris (Minn.) folio were ready to be printed and the illustrations were completed. The maps of the Elkton-Wilmington (Md.-Del.-Pa.-N. J.), Black Hills (S. Dak.), and Syracuse-Lakin (Kans.) folios were partly engraved. The Black Hills folio covers four quadrangles, and part of the same area is also represented on a larger scale in greater detail. Maps of several other folios and reports were drawn and partly prepared for publication in this sec-

tion during the year. In addition to the work on folios the maps, sections, and other illustrations for fifty Survey reports were critically reviewed by the geologist in charge of the section.

SECTION OF TOPOGRAPHIC MAPS.

At the beginning of the year 149 topographic maps were on hand for publication, and the accessions during the year were 78, making a total of 227 maps. Of these, 2 (Lynn, Ind.-Ohio, and Seiad, Cal.) were withdrawn for additional field work, 2 (Capon Bridge and Berryville, W. Va.) were printed for office use only, 93 have been published, 111 are in process of engraving and printing, and 19 (of which 12 have been edited) have not yet been transmitted to the engraving division. Of the 95 maps published (see list, pp. 31–32) 86 are new engraved maps and 9 are photolithographs. The following statement shows the comparative status of map editing and map publication on June 30 for the last seven years:

Progress of map publication for seven years ended June 30, 1917.

	1911	1912	1913	1914	1915	1916	1917
Published during the year	86	114	101	102	107	153	95
In process of engraving and printing	56	65	89	69	87	97	111
In hand for engraving	95	102	105	114	91	52	[a] 19

[a] Preparation of manuscripts from 1916 surveys delayed by war work.

The manuscripts edited during the year comprise 108 maps prepared for engraving, 3 maps for photolithography, 196 maps or sheets for the illustration of 30 Survey reports, and corrections for 227 maps about to be reprinted. The proof read comprises 84 new topographic maps, 5 maps engraved and printed under contract, and corrections to 104 old maps. The index maps for 9 circulars of the series 9–323 were revised and reprinted, 20 of the State circulars were revised and reprinted, as was also the wall index map of the United States.

The decisions of the United States Geographic Board have been grouped by States and counties, and a list in this form, without the descriptions, has been prepared for publication. A revision of Bulletin 299, Geographic dictionary of Alaska, has also been in progress and is far advanced. Six men were continuously employed in the section.

DIVISION OF ENGRAVING AND PRINTING.

TOPOGRAPHIC MAPS AND GEOLOGIC FOLIOS.

During the fiscal year 86 topographic maps were engraved and printed; other editions were 7 photolithographed State maps and 2 photolithographed topographic maps of Willamette Valley, making a total of 95 new maps.

Corrections were engraved on the plates of 211 maps and 17 were in hand for correction. Of the 211 corrected maps, 119 were for reprint editions, 59 were in hand for printing, and 33 were corrected for other purposes. Four photolithographic State maps were corrected and reprinted and reprint editions of 21 topographic maps in hand at the beginning of the year were completed.

Of the new and reprinted maps, 239 different editions, amounting to 781,644 copies, were printed and delivered to the map room. This is a decrease of 25 editions and 146,209 copies from the preceding year.

Five new geologic folios were published, of which three were double folios and one (Detroit, Mich.) contained five sets of geologic maps. State editions of two folios, an octavo edition of one folio, and a field edition of one folio were issued during the year. Editions and partial editions amounting to 21,753 copies were printed and delivered, an increase of 913 copies over the number printed in the preceding year; 1,732 extra areal-geology sheets of the different folios were also printed.

OTHER GOVERNMENT MAP PRINTING.

For the Government Printing Office the following items were printed and delivered: Illustrations for the annual reports of the governor of Alaska, the governor of Hawaii, the Commissioner General of Immigration, the Commissioner of Indian Affairs, and the Superintendent of the Coast and Geodetic Survey, Department of Commerce Special Publication 40, Department of Agriculture Bulletin 460; report of the Federal Trade Commission on the price of gasoline; soil surveys of Barbour County Ala.; Chickasaw County, Miss.; Dekalb County, Mo.; Dunklin County, Mo.; Franklin County, Fla.; Hamilton County, Ohio; Hampton County, S. C.; Latah County, Idaho; New Castle County, Del.; Richarson County, Nebr.; Schoharie County, N. Y.; Smith County, Tex.; Washington County, Nebr.; and Wells County, Ind.; Bureau of Mines Bulletin 107 and Technical Paper 155, American Ephemeris and Nautical Almanac, 1917, 1918, and 1920; Report on fertilizer industry (64th Cong., 1st sess., S. Doc. 872); Report on development of East Potomac Park (64th Cong., 1st sess., H. Doc. 1038); Geological Survey Bulletins 600, 621–B, 621–N, 621–O, 623, 629, 631, 640–J, 641–B, 641–D, 641–E 641–F, 641–J, 642–A, 642–B, 642–H, 651, 656, 657, 660–A, 660–C, 661–A, 661–C, 661–D, 661–F, 663; Professional Papers 93, 96, 97, 100–B, 101, 108–H; Water-Supply Papers 380, 395, 396, 400–E, 415, 417, 418, 419, 420, 421, 423, 424, 425–A; Mineral Resources, 1915 (chapters on coke, coal, and copper). In addition, the following separate illustrations were printed and delivered to the Government Print-

ing Office: Diagrams of two bird reservations, one elk reservation, one reservation for the use of natives of Alaska, one reservation for wireless-telegraph station, and two national monuments; maps of six national parks; for the Department of Agriculture outline maps of the United States by counties, relief maps of the United States, maps of the United States and North America (charts), map of the United States showing annual precipitation, map of India, and tick eradication map; for the Department of Commerce, candle-power scale and record sheet; for the General Land Office, protractor charts and folios of the Nenana coal fields, Alaska; for the Forest Service, fire-lookout protractor.

The following work was done for other bureaus and departments: For the General Land Office, 1,194 township plats, 579 mineral plats, 13 State maps showing homesteads, plats of 6 town sites, map of Fort Assinniboine Military Reservation, and other miscellaneous work; for the Office of Indian Affairs, 158 plats of Indian reservations, maps of 6 Indian reservations, plats of 2 town sites, certificates for Indian schools, and other miscellaneous work; for the National Park Service, 7 automobile guide maps, map showing national parks and monuments, administrative map of Rocky Mountain National Park, and other miscellaneous work; for the Forest Service, maps of 25 national forests, 15 recreation maps and fire folders, 2 atlas folios, 4 administrative maps, 9 proclamation diagrams of national forests, 1 game-reserve map, allotment-estimate forms, grazing-data chart, homestead-entry plat, map showing standing timber in the United States, index map, organization chart, and other miscellaneous work; for the War Department, 88 sheets of the Carta de la República Mexicana, map of Belgium, map of Island of Oahu, 5 Geological Survey topographic maps, map of Plattsburg training camp, and other miscellaneous work; for the Navy Department, 330 hydrographic charts and 576 British Admiralty charts.

Work was also done for the Interstate Commerce Commission, Bureau of Standards, Bureau of Mines, Reclamation Service, Bureau of Lighthouses, International Boundary Commissions, Department of Agriculture, States Relations Service, District of Columbia public schools, Weather Bureau, Eight-Hour Commission, Coast and Geodetic Survey, Chief of Engineers, United States Army, Department of Commerce, Office of Public Roads and Rural Engineering, and the commandant, Fort Myer, Va. This work for various branches of the Government amounted to about $97,000, for which the appropriation for engraving and printing geologic maps was reimbursed by transfer of credit on the books of the United States Treasury.

Work was also done for the University of Missouri; Rider Press, New York, N. Y.; Eckert Lithographing Co., Washington, D. C.; International Committee of Young Men's Christian Associations;

Edward T. Millar Co., Columbus, Ohio; University of Idaho; State of Wyoming; Everett Press, Boston, Mass.; Atchison, Topeka & Santa Fe Railway System; International Joint Commission; and John Wiley & Sons, New York, N. Y.; and the money received in payment for the work, amounting to $553.65, was turned into the Treasury of the United States, to be credited to miscellaneous receipts. On requisition of the Government Printing Office, 218 transfer impressions were made and shipped to contracting printers. Under cooperative agreements transfer impressions were furnished without charge to the State surveys of New York, West Virginia, Illinois, and Massachusetts.

Of contract and miscellaneous printing of all kinds the total number of copies delivered was 3,338,028, which required 9,805,217 printings. The total number of copies printed, including topographic maps and geologic folios, was 4,141,425, requiring 14,283,845 impressions.

The sales of maps and folios itemized on page 159, together with $553.65 of other miscellaneous receipts for map work, aggregated $35,889.79, so that more than one-fourth of the amount appropriated for engraving and printing the Survey maps was returned to the Treasury.

PHOTOGRAPHIC LABORATORY.

The output of the photographic laboratory consisted of 18,255 negatives, of which 3,517 were wet, 2,477 dry, 1,351 paper, 7,959 field negatives developed, 621 lantern slides, and 2,330 were made for photolithographs; 4,435 zinc plates; 357 zinc etchings; 355 celluloids; and 45,910 prints, of which 23,666 were maps and diagrams and 22,244 were photographs for illustrations. In addition 1,766 prints were mounted and 42 lantern slides were colored.

ADMINISTRATIVE BRANCH.

EXECUTIVE DIVISION.

Mails and files.—During the year 273,308 letters were received, an increase of 7 per cent compared with 1916. Of these letters 26,909 contained $36,753.88 remitted for Survey publications, an increase of 14 per cent in number of letters and of $4,740.96 in amount compared with 1916.

The total letter mail sent out from the Survey numbered 566,330, an increase of 30 per cent over 1916. The recording, referring, filing, and mailing of correspondence required the services of nine clerks.

Personnel records.—The roll of Secretary's appointees numbered 934 at the end of the fiscal year, 62 more than at the end of 1916. The total number of changes in the personnel was 904, which included 294

appointments, 234 separations, 339 promotions, 2 demotions, and 35 miscellaneous changes.

During the year 13,762 days of annual and 2,677 of sick leave were granted, being 59 per cent of the amount of annual leave and less than 2 per cent of the amount of sick leave permissible to grant under the law; 4,030 days of leave without pay were also granted.

DIVISION OF ACCOUNTS.

A condensed statement covering the financial transactions of the fiscal year is given below, including disbursements up to August 11. The unexpended balances of that date largely represent outstanding obligations.

Amounts appropriated for and expended by the United States Geological Survey pertaining to the fiscal year ended June 30, 1917.[a]

Title of appropriation.	Appropriation.	Repayments.	Available.	Disbursements.	Balance.
Salaries, office of Director	$35,340.00	$2.67	$35,342.67	$34,433.66	$909.01
Salaries, scientific assistants	29,900.00	.....	29,900.00	29,482.73	417.27
Skilled laborers, etc	20,000.00	.....	20,000.00	19,969.49	30.51
Gaging streams, etc	150,000.00	36,788.93	186,788.93	186,667.39	121.54
Chemical and physical researches	40,000.00	.....	40,000.00	38,497.42	1,502.58
Preparation of illustrations	18,280.00	72.70	18,352.70	18,196.87	155.83
Mineral resources of United States	75,000.00	15.79	75,015.79	73,265.09	1,750.70
Geologic maps of United States	110,000.00	97,176.48	207,176.48	194,229.88	12,946.60
Books for the library	2,000.00	.....	2,000.00	1,708.91	291.09
Topographic surveys	350,000.00	104,373.37	454,373.37	443,598.35	10,775.02
Geologic surveys	350,000.00	9,666.90	359,666.90	351,531.73	8,135.17
Mineral resources of Alaska	100,000.00	492.48	100,492.48	93,047.41	7,445.07
Surveying national forests	75,000.00	15.30	75,015.30	74,923.97	91.33
	1,355,520.00	248,604.62	1,604,124.62	1,559,552.90	44,571.72

[a] In addition to these appropriations amounts aggregating $215,000, for Survey publications and for rent of the building occupied by the Survey, were allotted from other appropriations but not disbursed by Survey officials.

Classification of expenditures by the United States Geological Survey pertaining to the fiscal year ended June 30, 1917.

Appropriation.	Total.	Salaries and wages.	Transportation of persons.	Transportation of things.	Subsistence and support of persons.	Subsistence and care of animals.	Communication service.	Printing, engraving, lithographing, etc.	Advertising and publication of notices.	Furnishing heat, light, power, etc.	Special and miscellaneous service.	Materials.	Stationery drafting, etc., supplies.
Salaries, office of the Director	$34,433.66	$34,433.66											
Salaries, scientific assistants	29,482.73	29,482.73											
Skilled laborers, etc	19,969.49	19,969.49											
Gaging streams, etc	186,667.39	140,447.76	$14,907.91	$1,080.32	$9,805.48	$114.42	$781.41	$588.98		$8.40	$2,147.39	$3,200.49	$2,312.16
Chemical and physical researches	38,497.42	27,884.05	283.54	428.98	1,836.86	187.26	84.14	8.85		322.39	326.30	2,018.09	352.62
Preparation of illustrations	18,196.87	17,121.01		.62			.30	659.45			1.42	174.93	55.04
Mineral resources of U. S	73,265.09	67,933.69	1,500.49	83.00	1,413.19		583.56	103.04			448.20	.34	873.83
Geologic maps of U. S	194,229.88	136,010.81	104.74	25.55	52.20		84.73	3,634.36		2,014.32	1,557.77	4,325.37	42,509.01
Books for the library	1,708.91			2.42			.10						47.60
Topographic surveys	443,598.35	278,616.81	40,588.36	2,972.28	75,958.05	10,119.24	1,141.30	5,665.78			1,296.54	2,254.59	1,917.14
Geologic surveys	351,531.73	304,217.52	14,845.59	892.01	13,644.42	3,919.71	580.75	4,422.75	$0.60		2,151.71	186.83	1,549.28
Mineral resources of Alaska	93,047.41	60,916.92	13,344.91	2,613.79	4,388.41	105.94	118.37	1,305.89			583.95	419.46	468.58
Surveying national forest	74,923.97	48,125.75	3,538.72	556.79	11,309.45	5,755.31	79.56	123.08			219.47	367.90	304.65
	1,559,552.90	1,165,160.20	89,114.26	8,655.76	118,408.06	20,201.88	3,454.22	16,512.18	.60	2,345.11	8,732.75	12,948.00	50,389.91

Appropriation.	Fuel.	Mechanic's, engineer's, etc., supplies.	Cleaning and toilet supplies.	Wearing apparel.	Forage and other supplies for animals.	Provisions.	Ammunition and explosives.	Special and miscellasupplies.	Equipment (including live stock).	Structures (bench marks).	Rent.	Maintenance, operation, and repair of passenger-carrying vehicles.	Purchase of passenger-carrying vehicles.
Salaries, office of the Director													
Salaries, scientific assistants													
Skilled laborers, etc													
Gaging streams, etc	$255.15	$187.96	$7.89	$112.91	$10.75	$47.00	$20.38	$52.67	$7,878.09		$1,202.25	$1,247.62	$250.00
Chemical and physical researches	730.11	54.67					5.39	37.25	3 821.21			115.71	
Preparation of illustrations									184.10				
Mineral resources of U. S		.63	1.59					.10	323.43				
Geologic maps of U. S	83.62	256.74	3.96	31.00					3,535.70				
Books for the library									1,658.79				
Topographic surveys	1,392.50	158.55	75.75	300.79	6,210.61	897.30	2.20	233.50	5,032.42	$2,548.50	87.00	2,504.79	3,624.35
Geologic surveys	106.04	33.32	18.25	44.40	687.94	1,545.70	1.35	116.41	1,582.01			985.14	
Mineral resources of Alaska	794.91	98.85	44.16	187.24	104.16	3,219.29	39.84	27.74	4,211.00		54.00		
Surveying national forests	96.41	9.57	12.67	8.20	2,443.25	97.25		22.91	1,678.76		28.52	145.75	
	3,458.74	800.29	164.27	684.54	9,456.71	5,806.54	69.16	490.58	29,905.51	2,548.50	1,371.77	4,999.01	3,874.35

LIBRARY.

During the year the library received 9,352 books, pamphlets, and periodicals and 438 maps, a total of 9,790 publications. Current accessions were catalogued as received. Titles sent to the Library of Congress for printing numbered 589; letters received, 3,768; letters written, 1,926; books collated and bound, 1,625. The loans during the year included 5,961 books and 287 maps. This number does not include books consulted in the library by 7,491 readers.

REPORT OF THE DIRECTOR OF THE BUREAU OF MINES.

REPORT OF THE DIRECTOR OF THE BUREAU OF MINES.

VAN. H. MANNING, DIRECTOR.

PROVINCE AND DUTY OF THE BUREAU OF MINES.

The province and duty of the Bureau of Mines, as prescribed in its amended organic act (37 Stat., 681) are to conduct scientific and technologic investigations concerning mining and the preparation and utilization of mineral substances with a view to the increase of health, safety, and efficiency in the mineral industries. Thus the work of the bureau is investigative—to determine the causes of accidents and to ascertain how injuries and fatalities from accidents may be lessened or prevented; to find ways of abating such wastes as have accompanied the mining and treatment of the mineral resources of the Nation, and to ascertain how these resources may be developed and utilized with greater safety and efficiency.

The bureau has no police powers such as are given to mining bureaus or departments in some countries; consequently it seeks to advance its purpose by enlisting the cooperation and support of all agencies working for the same ends. In its efforts to promote the health and safety of workers in the mineral industries and to lessen waste and increase efficiency in the utilization of mineral resources, the Bureau of Mines welcomes the cooperation of operators, of workmen's organizations, of technical societies, and of State officials and State governments in bringing about the adoption of safer devices and methods or in the enactment and enforcement of better mining laws. Believing that its investigations deal with matters of national concern and realizing how little it can do by itself, the bureau gratefully acknowledges the cordial support and hearty cooperation given it by miners, mine operators, chemists, metallurgists, engineers, industrial corporations, and State establishments. Already much has been done, but much more remains to be done. The bureau seeks a wider cooperation and a better coordination of effort among those working for the advancement of the mineral industries, and it hopes that one of the lasting results of the present cooperative efforts to increase safety and efficiency in the mineral industries will be the development of a general realization of the need of cooperative endeavor in every phase of our national life.

SUMMARY OF SPECIAL WAR WORK.

During the latter part of the fiscal year an increasing proportion of the work of the Bureau of Mines has related to some phase of the military problems that are developing. Early in the year the director prepared a comprehensive outline of the possible service that the bureau could render in the event of war.

The director was appointed a member of the military committee of the Research Council, and later of all of the various committees dealing with fuel and mineral products under the Council of National Defense.

Several highly important technical problems were undertaken in direct cooperation with the Department of War and the Department of the Navy. At the close of the year arrangements were being made to bring about close cooperation with various State bureaus and technical societies in the problem of stimulating domestic mineral production, particularly the production of those minerals that have been largely imported and are most likely to be in short supply.

A number of special reports were submitted by the director to the various committees of which he is a member. Among these reports were a general summary of the problems connected with minerals of military importance, a summary of the sulphuric acid situation, a report on the petroleum situation, and maps and charts dealing with coal production.

The more important special tasks that have been undertaken are as follows:

NITRATE SUPPLY.

The Bureau of Mines is cooperating with the War Department in an investigation of the nitrate situation and the methods of fixing atmospheric nitrogen so that it may be available for making munitions and fertilizers. C. L. Parsons, chief chemist of the bureau, went to Europe to investigate processes used in England, France, Italy, Norway, and Sweden, and to obtain information regarding the latest processes used in Germany. His report and recommendations were adopted in substance by the committee on nitrate supply, and a large plant for the production of nitric acid for war purposes and of ammonia for agricultural purposes is in process of erection.

The preparation of nitric acid from ammonia is an essential step in the production of explosives from atmospheric nitrogen. Until recently the processes for ammonia oxidation have been used only in Europe, and chiefly in Germany, and have been carefully guarded. The Bureau of Mines, in cooperation with the Semet-Solvay Co., has developed entirely new apparatus for oxidizing ammonia, so that the Government is free of all patents and secret rights for methods of producing this very important material.

RAW MATERIALS FOR SULPHURIC ACID.

The bureau has cooperated with the chemical and the fertilizer committees of the Council of National Defense in dealing with the problem of mineral raw materials for sulphuric acid manufacture. A. G. White, mine economist, prepared a comprehensive report on the acid situation. An extensive investigation of the possibilities of saving pyrite or marcasite from coal mines was undertaken by the mining division with a view to conserving a valuable by-product from what has formerly been a waste material and even a source of danger in the mines. A number of the most promising pyrite mines have been examined. Studies of the possibility of using pyrrhotite and the steps required to develop a home supply of raw material for acid manufacture have been carried out by the division of mineral technology.

WAR GASES AND GAS MASKS.

Because of the experience gained in the study of the origin of poisonous gases in mines, the methods of combating such gases and the various types of protective apparatus used for rescue and recovery work in bad air, the chemical and mining divisions of the bureau are working in cooperation with the War and Navy Departments in investigating the gases and gas masks used in war. This work, which has assumed extensive proportions, is under the direction of G. A. Burrell, chemical engineer.

NICKEL SUPPLY.

The division of mineral technology has undertaken the study of the possibilities of developing a domestic nickel industry. Nickel deposits that appear most likely to warrant development have been examined. Information has been compiled as to the Canadian deposits that are the present chief sources of the world's supply. This study has been carried out by C. E. Julihn, mineral technologist.

MANGANESE SUPPLY.

Since the beginning of the war the Bureau of Mines has given particular attention to the problem of finding ways and means of supplying, from the deposits existing in this country, the manganese required by the iron and steel industry for the production of high-grade steel. W. C. Phalen, mineral technologist, has examined the chief manganese-producing districts of this country with a view to ascertaining their importance as sources of an adequate supply of manganese ore. The results of this examination indicate that a considerable proportion of our requirements can be supplied.

QUICKSILVER.

Quicksilver is another of the mineral resources of the country to which the Bureau of Mines has given particular attention. At the time of the entry of the United States into the war the probable extent of the demand for this metal was not known. However, in order to be able to meet the demand whenever it should develop, the Bureau of Mines at once took steps to investigate the status of the industry, studying the processes used in extracting quicksilver from its ores, and devising means whereby losses of the metal in the operation of these processes might be minimized. With the cooperation of the men concerned in the industry most favorable progress has been made in the lessening of the waste that formerly took place, thus increasing the Nation's supply of this most valuable war metal.

POTASH.

In the past this country has been dependent on foreign countries for its supply of potash. Consequently, at the outbreak of the war the Bureau of Mines at once took up the problem of determining how the supply of potash needed in this country could be commercially obtained from our potash-bearing minerals, and especially from waste materials, such as mill tailings produced in the ore-dressing and metallurgical processes connected with the treatment of nonferrous ores, and dust from cement plants. Most satisfactory progress has been made, and from present indications this country will be able to obtain in the future a considerable part of the potash it needs from what are now considered waste materials.

PETROLEUM PRODUCTS.

One of the divisions of the Bureau of Mines is working on the production, transportation, refining, and utilization of petroleum. Immediately after the declaration of war a report was prepared, in cooperation with the United States Geological Survey, on the general conditions in the petroleum industry to show whether war needs could be readily met. This report was delivered to the committee on petroleum of the Council of National Defense and to the Public Lands Committee of the Senate, whose members were then considering the situation regarding petroleum lands.

Special statistics have been gathered for refinery products, particularly with regard to the supply of gasoline. Methods of increasing the recovery of gasoline from heavy oils and from natural gas have been developed. A report on accounting and cost keeping for oil producers has been completed. The reserves of oil shale have been investigated with a view to developing methods of treatment to supply our future needs.

An educational campaign has been undertaken to eliminate waste in the use of gasoline. The bureau has cooperated with the Navy Department in the design and construction of oil-storage tanks and reservoirs.

Specifications for the gasoline to be used for aeroplanes for our Government have been furnished, and an investigation has been started to determine the grades of gasoline best adapted for different types of aeroplane motors. Information already available has been supplied to the military representatives of our allies, and, with a view to furnishing maximum and immediate service to the aviation service, the Bureau of Mines is establishing a station in charge of a petroleum mechanical engineer to test all fuels submitted for use in aeroplane motors. At the Pittsburgh and Washington laboratories many samples of gasoline are being tested for all branches of the Federal Government.

COAL.

The fuel division of the bureau tests all coal used for military purposes. An educational campaign is being conducted to promote greater efficiency in the utilization of coal and to prevent unnecessary waste. The Director of the Bureau of Mines, as a member of the coal committee of the Council of National Defense, has made available for the committee's use all the technical information in the possession of the bureau. In addition, an extensive series of maps was compiled for the committee.

EXPLOSIVES.

The explosives-testing sections of the bureau's mining division have done important work for the Ordnance Department of the War Department and for industrial establishments in testing various substitutes for the scarcer and more expensive constituents of war explosives. The bureau is now investigating the use of liquid oxygen and carbonaceous material as a blasting explosive and a substitute, under favorable conditions, for dynamite in mines and quarries.

OTHER INVESTIGATIONS.

Other work related to problems developing in connection with the war includes a study of the formation of concealing smoke or dust clouds for use in warfare, experiments with a special electric furnace to melt brass for cartridges, and a study of the recovery of tin from scrap.

CENSUS OF TECHNICAL MEN.

At the request of the Council of National Defense, the Bureau of Mines, through its section of statistics at the Washington office, took a census of chemists, mining engineers, and metallurgists in the United States. The number of chemists who responded to the re-

quest for information was 15,000, and the listing of the returns required 28,000 classification cards. The number of mining engineers who responded was 7,500; to list them according to experience required 30,000 classification cards. A list of metallurgists was made from the combined returns from the chemists and the mining engineers. The bureau now has on file a classified list of technical men showing the character of the work in which they are proficient in the various branches of the chemical and the mining industries; the names are also classified according to the actual experience the men have had in foreign countries, so that it is possible, should occasion arise, to select men especially suited for work in almost any branch of chemistry, mining, or metallurgy. The compilation of this census was in immediate charge of A. H. Fay, mining engineer.

COOPERATIVE AGREEMENTS.

To insure the most effective action with State agencies seeking either to increase health and safety among workers in the mineral industries or to lessen waste and improve efficiency in the production, treatment, and utilization of mineral substances, the Bureau of Mines has made cooperative agreements with State organizations and with State universities and mining schools. These agreements, which specify the character of the work to be done under them and the nature of the cooperation, are made with the approval of the Secretary of the Interior.

In the past fiscal year investigations as outlined were conducted under the terms of cooperative agreements with the universities, mining schools, and State organizations named below:

Industrial Accidents Commission of California.—Conditions under which mining, milling, and smelting are done, with a view to promoting health and safety; other inquiries pertinent to mining and metallurgical industries; and the obtaining of reports on accidents to workmen in these industries.

University of California, Berkeley, Cal.—Study of mining and metallurgical processes, with a view to increasing efficiency in the preparation, treatment, and utilization of mineral substances; and metallurgical investigations.

University of Idaho, Moscow, Idaho.—Investigations aimed at the improvement of ore-dressing and metallurgical processes.

Colorado School of Mines, Golden, Colo.—Studies of the methods of mining and treating mineral substances, and especially the treatment of rare metals.

Engineering Experiment Station of the University of Illinois, Urbana, Ill., and Illinois Geological Survey.—Study of coal-mining

methods, means of promoting the safety of coal miners, and methods of utilizing coal.

Metallurgical department of the University of Kansas, Lawrence, Kans., with reference to the milling of lead and zinc ores, and especially the concentration of ores in the Galena district and their treatment by flotation.

Oregon Bureau of Mines and Geology.—Investigations aimed to improve conditions in the mining, quarrying, metallurgical, and other mineral industries.

State School of Mines of the University of Utah, Salt Lake City, Utah.—Methods of treating low-grade and complex ores, with a view to increasing efficiency in the preparation, treatment, and utilization of mineral substances, and other investigations pertaining to the metallurgical industry.

University of Washington, Seattle, Wash.—Investigations relating to beneficiation of low-grade coals and nonferrous complex ores; and the application of electrometallurgical processes to the treatment of low-grade and complex ores.

SOME OF THE MORE IMPORTANT ACHIEVEMENTS OF THE YEAR.

In addition to the special investigations, already summarized, that related to problems of National preparedness and defense, the Bureau of Mines carried on work that yielded the results summarized below.

More than 4,800 miners were trained in mine rescue and first-aid methods. Miners in 23 States were trained. On June 30, 1917, the total number of miners trained by the bureau since its organization was 46,873.

Representatives of the bureau investigated 63 accidents or disasters throughout the United States, of which 57 were at mines. At the mines 103 men were rescued through the efforts of volunteer miners, company officials, State mine inspectors, and company rescue crews. At 19 of the 63 accidents investigated breathing apparatus was worn.

Twenty-two rescue and first-aid contests or field meets attended by Bureau of Mines members were held throughout the country. Some of these contests were arranged and supervised by Bureau of Mines men.

More than 39,000 miners attended lectures on first-aid and rescue methods given at the bureau's mine safety stations and cars.

Tests made during the year indicate that lime, which is considerably cheaper than caustic soda, can be used in the regenerators of oxygen breathing apparatus to replace caustic soda.

Some further improvements were made in the Gibbs oxygen-breathing apparatus, developed by the Bureau of Mines.

First-aid methods and materials, as well as mine-rescue methods, were revised and standardized.

Investigations of the explosibility of coal dust under mine conditions have given valuable data for the determination of the relative hazard of dust explosions in coal mines throughout the country.

Tests of spreading rock dust in coal mines as a means of arresting or preventing coal-dust explosions have shown how the cost of protecting mines in this way can be decidedly reduced.

In cooperation with the Illinois Geological Survey and the department of mining engineering of the University of Illinois, the bureau began a comprehensive investigation of the subsidence of the ground over coal mines.

The use of permissible explosives instead of black powder in the coal mines of Oklahoma, a change advocated by the Bureau of Mines, has continued to lessen the risk of explosions in those mines.

Investigations of mine fires at Butte, Mont., have shown the great loss caused by these fires, the difficulty of preventing them, and the need of further study.

Studies of the explosives used for blasting in mines were continued with the aim of reducing the dangers that attend the use of explosives in mining.

Ten more explosives were tested and approved as permissible for use in dusty or gaseous coal mines. At the end of the year 151 explosives were on the permissible list.

Tests at the experimental mine of the bureau have demonstrated that it is possible to determine whether black powder or a high explosive was used in a blown-out shot such as sometimes causes a disastrous mine explosion, and that it is easy to ascertain whether the high explosive detonated or merely burned.

Propylene-glycol was studied to determine the probable use of this substance in explosives, because of its cheapness and desirable properties, it is being substituted for glycerin in the manufacture of high explosives.

Safety investigations made in cooperation with State officials have resulted in greatly reducing the danger from accidents in California mines.

Further progress was made in methods of eliminating from smelter smoke the fumes that cause injury to animals and crops.

Substantial advances were achieved in methods for utilizing the sulphur in the sulphur gases from smelters.

Methods for treating the low-grade and complex ores of copper, lead, and zinc have been further developed and are being tried on a commercial scale. These methods are expected to render available vast quantities of ore that now can not be worked at a profit.

Investigations of the flotation process for concentrating ores have shown how the use of this process may be extended and made more efficient.

A report on the methods of making salt in the United States was transmitted for publication.

Methods of mining and calcining gypsum and of preparing gypsum products were described in a report now in press.

An investigation of the methods used in quarrying cement rock is showing what are the most effective quarrying methods and types of equipment and the most effective ways of preventing accidents.

As a result of clay-refining investigations, vast quantities of domestic kaolin have been made available for the use of American potters who formerly depended on foreign clays.

As a result of investigations that have been carried on in cooperation with the Bureau of Mines, one large copper company is expending $1,600,000 for equipment to recover dust and fume from the smoke of its smelter.

Decided advances have been made in plans for utilizing locally the sulphuric acid that can be obtained from smelter smoke; these plans include the manufacture of superphosphate for fertilizer and high-grade phosphoric acid, and the improvement of alkaline soils by direct application of acid.

A method of leaching oxidized ores of lead with an acid solution of common salt has been worked out that promises to be of wide value.

Further progress was made in applying a volitilization process (chloridizing roast) to the treatment of oxidized lead ores containing gold, silver, or copper.

Encouraging results have been obtained in the further development of a leaching process for low-grade zinc ores.

Reports discussing health conditions at iron and steel plants and the methods by which injuries and fatalities can be greatly lessened were revised and are now in press.

Further investigation of the viscosity of blast-furnace slags is yielding information that should be of great benefit to furnacemen and should facilitate the changes in practice necessary to smelt the lean and complex ores that will be used as high-grade ores become scarcer.

Material was collected for a comprehensive report on the hydrometallurgy of gold and silver and a popular report on the present condition of the cyanide process.

Experiments with steam boilers have yielded reliable data for the design of boilers that will absorb a higher proportion of the heat from the furnace fires.

A study of the fuel-burning equipment and the conditions under which fuel is burned at more than 30 Indians schools and agencies

throughout the country has shown how decided economies in the use of fuel at many of these institutions can be had.

The comparative values of different fuels, as coal and wood, for use in heating boilers for houses have been determined through an extensive series of experiments.

A bulletin showing the extent to which Illinois coals have been used in making coke and the possibility of extending such use was transmitted for publication.

An investigation aimed to increase the use of Illinois coal in the manufacture of illuminating gas was undertaken.

Investigations of methods of utilizing lignite have yielded additional facts of value to residents of the regions in which lignite abounds.

An improved electric furnace for melting brass has been devised and is being tested on a commercial scale; by its use it is hoped that the losses of metal in brass melting, which amount to millions of dollars annually, can be greatly reduced.

A comprehensive investigation of the fire clays of Maryland was undertaken.

Special consideration has been given the utilization of coal at Government plants throughout the country, and recommendations have been made looking to an annual saving of fully $300,000 in the Government's coal bill.

Studies of the combustion of coal in furnaces have brought out facts of great value to engineers in designing furnaces to burn different kinds of coal with greater efficiency.

Tests with boiler furnaces have shown how coal can be utilized more efficiently in heating dwellings.

Rules published by the bureau for the purpose of setting a higher standard of safety in the electrical equipment of bituminous coal mines have been formally approved for trial by the American Institute of Electrical Engineers.

A flash lamp permissible for use in gaseous mines has been developed.

Two new models of portable electric lamps were approved as permissible for use in coal mines. As a result of the investigations begun by the bureau four years ago, more than 100,000 approved portable electric lamps are now in use in the mines of this country.

Further progress was made in the development of explosion-proof motors for use in gaseous mines.

An accurate, sensitive, and convenient electrical device for detecting gas (methane) has been developed. A satisfactory lamp for use in rescue and recovery work in mines after disasters has been completed.

Investigations of radium have resulted in improving the methods used in recovering radium from carnotite ores and pitchblende,

and the treatment of carnotite concentrates has been facilitated. Through its radium investigations the bureau has acquired more than a gram of radium element, valued at more than $100,000, which is to be used for scientific and medical research.

Investigations of methods of extracting molybdenum and vanadium, metals needed in the manufacture of special steels, are yielding important results.

From the uranium oxide obtained as a by-product in the recovery of radium a high-grade ferro-uranium has been prepared that promises to be of much value in the manufacture of uranium steel.

A pyrometer devised for measuring the melting point of brass and other nonferrous alloys promises to be of decided value to the brass industry.

The use of mud-laden fluid to save underground supplies of oil and gas and prevent wastes in well drilling has been greatly extended.

Through cooperative work in various States improved drilling methods are being more widely used.

An investigation of methods for increasing the recovery of oil from oil sands has shown the enormous quantities of oil left underground in many oil fields and has suggested methods of preventing such waste in future.

A bulletin on "Cost accounting for oil producers," believed to be the simplest and most comprehensive treatise on this subject, has been prepared for publication.

Cementing methods of excluding water from the productive sands penetrated by oil or gas wells, thus preventing great loss of oil and gas, were investigated.

The decline of oil wells and the ultimate production of oil lands were also investigated.

Methods of storing petroleum in tanks or reservoirs were described in detail in a report submitted for publication.

Methods by which the proportion of gasoline obtainable from natural gas is being greatly increased were described in a bulletin on the absorption process for recovering gasoline.

Compression plants for recovering gasoline from natural gas and many details of plant practice were described in a bulletin submitted for publication.

An investigation of what are known as topping plants for separating the higher hydrocarbons from crude oil has shown how much waste of gasoline at such plants may be prevented.

An investigation of the fires that annually cause great losses in the oil fields of this country has shown the need of using preventive measures in advance of present practice.

A comprehensive report on the Diesel engine has been prepared for publication as a bulletin.

An investigation of the use of gas traps at oil wells has shown what are the best types of traps and what great quantities of gasoline have been wasted at oil wells through failure to use these devices.

Commercial types of gasoline sold throughout the United States were examined and methods for making satisfactory laboratory tests were published.

The characteristics of different types of gasoline and their relative merits as motor fuel were determined.

Further work was done in the commercial development of the vapor-phase process for obtaining gasoline from heavier petroleum products.

Investigations of the oil shales in Colorado and Utah have shown that it is now feasible to work these shales as a source of petroleum in competition with oil from oil wells.

Methods for determining the fusibility of coal ash and the consequent liability of coal to clinker were improved.

Further progress was made in investigations of mine gases.

ORGANIZATION OF THE BUREAU OF MINES.

GENERAL OUTLINE.

As the work of the Bureau of Mines has for its purpose the increase of safety, health, and efficiency in the mineral industries, it necessarily relates to the development of national efficiency and to the improvement of the welfare of more than a hundred million people. In consequence, the work of the bureau tends to increase as new problems arise or new tasks are assigned by Congress, and the organization of the bureau necessarily changes as the work grows and duties multiply. During the fiscal year ended June 30, 1917, the various investigations conducted were for purposes of administration grouped under five divisions, each in charge of a division chief who reported to the director.

The strictly administrative work at the bureau headquarters in Washington, D. C., was under the immediate supervision of the director, Van. H. Manning. The local administration of the mining experiment station at Pittsburgh was intrusted to Lauson Stone, engineer. L. H. Duschak, chemical engineer, acted as administrative head of the Berkeley, Cal., station of the bureau; R. B. Moore, physical chemist, acted in a similar capacity for the Golden, Colo., station. A. E. Wells, metallurgist, was in charge of the Salt Lake City, Utah, station; D. A. Lyon, metallurgist, was in charge of the Seattle, Wash., station, and C. E. Van Barneveld was supervising engineer and metallurgist of the Tucson, Ariz., station.

F. J. Bailey, chief clerk, was in charge of routine administrative matters at the Washington office. J. W. Thompson and Max Ball, law examiners; J. L. Cochrane, in charge of the distribution of publications; S. Sanford, engineer, in charge of editorial work; and A. H. Fay, mining engineer, charged with the collection of mine-accident statistics, were also stationed at the Washington office.

In addition to the work being done under the several division chiefs, various investigations that relate to safety or efficiency in the mineral industries are conducted under the direct supervision of the director, who also has general supervision of the work of the Federal mine inspector for Alaska, and the inspection of coal mines on Indian or Government lands in Oklahoma and Wyoming.

The director, in the conduct of the technical work of the bureau, has the benefit of the advice of the advisory committee, consisting of the chiefs of the different divisions, and of the consulting experts connected with the bureau.

Such administrative functions as the general supervision of the bureau's library and the conduct of affairs with respect to matters of personnel, mails and files, supplies, and accounting were centered at the Washington office under the supervision of the director.

MINING DIVISION.

The field activities of the mining division, including all investigative, rescue, and training work, are conducted under an organization by which the country is divided into nine districts. George S. Rice, chief mining engineer, stationed at Washington, is in charge of the division and gives personal attention to the various branches of the work.

H. M. Wolflin, mine safety engineer, stationed at Pittsburgh, had charge of mine-rescue operations and the testing of mine-rescue apparatus until January 1, 1917. Mr. Wolflin also had general supervision of the educational work, such as the training of miners in first-aid and rescue methods and the conduct of rescue and first-aid contests. When Mr. Wolflin went to San Francisco to represent the Bureau of Mines under the cooperative agreement with the State of California, acting as chief mine inspector of the Industrial Accidents Commission of California, D. J. Parker, mine safety engineer, succeeded him at Pittsburgh.

On April 9, 1917, J. W. Paul, who during the preceding year had been a consulting mining engineer for the bureau, was appointed coal-mining engineer and designated chief of coal-mining investigations. In this work Mr. Paul has charge of all field investigations and all work at the experimental mine pertaining to coal mining.

The districts in which the field forces work, the name of the engineer in charge of each district, and his headquarters are given on pages 569 to 571.

Sumner S. Smith, mining engineer, served as Federal mine inspector for the Territory of Alaska, with headquarters at Juneau, Alaska.

Special investigations undertaken by the mining division and the names of the officials in charge are outlined below:

Metal-mining investigations, in direct charge of Mr. Rice.

Tests of different types of mine-rescue apparatus, J. W. Koster, assistant mining engineer, under the supervision of Mr. Parker.

Tests of methods of preventing explosions and various tests of mine equipment, conducted at the experimental mine near Bruceton, Pa., and in the field, were in charge of L. M. Jones, mining engineer, until his death at the Jamison mine on October 20, 1916. W. L. Egy, assistant physicist, was then placed in charge of this testing.

Physical tests of mine explosives, S. P. Howell, explosives engineer.

Chemical tests of mine explosives, W. C. Cope, explosives chemist, and A. C. Fieldner, chemist.

Use of permissible explosives and inspection of coal mines on Indian lands in Oklahoma, J. J. Rutledge, mining engineer.

General health conditions in mines and mining communities, W. A. Lynott, mine surgeon, in collaboration with the Public Health Service.

Siliceous rock dust in mines as a cause of pulmonary disease among miners, with especial reference to mines in the Joplin district, Missouri, Edwin Higgins, mining engineer, in collaboration with A. J. Lanza, passed assistant surgeon of the Public Health Service.

Prevalence and cause of pulmonary disease among miners in the Butte (Mont.) district, Daniel Harrington, mining engineer, and Dr. Lanza.

Causes and prevention of subsidence from coal mining in certain districts in Illinois, under the direct supervision of Mr. Rice.

Investigations of coal-mine gases, in cooperation with the State of Illinois, H. I. Smith, assistant mining engineer.

Use of permissible explosives in Illinois, J. R. Fleming, assistant mining engineer.

First-aid instruction, W. A. Lynott, mine surgeon.

DIVISION OF MINERAL TECHNOLOGY.

The work of the division of mineral technology is under the direction of Charles L. Parsons, chief mineral technologist and chief chemist, with headquarters at Washington, D. C. The investigations pursued during the year and the officials in charge were as follows:

Metallurgy of radium and radio-active substances and the extraction of radium from its salts, R. B. Moore, physical chemist.

Rare-metals investigations, including the chemical technology of molybdenum, vanadium, uranium, and tungsten, Mr. Moore.

Study of manganese deposits and the mining and technology of manganese, W. C. Phalen, mineral technologist.

Investigation of nonferrous alloys, with particular reference to preventing metal losses in brass melting, H. W. Gillett, alloy chemist.

Ceramic-industry investigations, A. S. Watts, consulting quarry technologist.

Quarry technology, with special reference to the quarrying of sandstone, limestone, marble, and cement rock, Oliver Bowles, quarry technologist.

Technologic investigation of ores and mineral substances, with a view to increasing the efficiency and the economic development of these resources, Carl E. Julihn, mineral technologist.

FUELS AND MECHANICAL-EQUIPMENT DIVISION.

The fuels and mechanical-equipment division is under the supervision of O. P. Hood, chief mechanical engineer.

The investigations undertaken during the year and the officials in charge were as follows:

General fuel investigations, Mr. Hood.

Inspection of Government fuel purchases, G. S. Pope, engineer.

Fuel efficiency, Henry Kreisinger, engineer.

Boiler and furnace efficiency in Government plants, S. B. Flagg, engineer.

Electrical equipment in mines, H. H. Clark, electrical engineer.

Mine equipment, Mr. Hood.

Mine rescue apparatus, W. E. Gibbs, engineer of mine-safety investigations.

Tests of safety lamps, Mr. Clark.

Utilization of lignite, E. J. Babcock, assistant engineer.

General investigation of the increase of efficiency in gas-producer design and practice, R. H. Fernald, consulting engineer.

Analysis of coal purchased for the Government, H. M. Cooper, chemist.

Investigation of coke by-products, J. K. Clement, physicist.

Deterioration and spontaneous combustion of coal in storage, H. C. Porter, chemist.

Investigation of coal-mine hoisting accidents and hoisting equipment, Mr. Hood and R. H. Kudlich, mechanical engineer.

Coking of Illinois coal, F. K. Ovitz, assistant chemist.

Manufacture of illuminating gas Mr. Ovitz.

PETROLEUM DIVISION.

The petroleum division, since the resignation of W. A. Williams on January 1, 1917, has been under the supervision of Chester Naramore, chief petroleum technologist, with headquarters at Washington. The investigations undertaken and the officials in direct charge have been as follows:

Methods for increasing the recovery of oil from oil sands, J. O. Lewis, petroleum technologist.

Special cooperation with the Land Office and the Department of Justice in a study of water problems in the California oil fields, W. F. McMurray, oil and gas inspector, and Mr. Lewis.

Special cooperation with oil-well operators, W. S. Kyle and Mr. McMurray, oil and gas inspectors.

Investigation of the geology and underground conditions in the Cushing field, Okla., C. H. Beal, petroleum technologist.

Oil-field accounting, C. G. Smith, consulting petroleum accountant.

The exclusion of water from oil wells, F. B. Tough, assistant petroleum technologist.

Methods of storing oil, C. P. Bowie, petroleum engineer.

Oil-camp sanitation, Mr. Bowie.

Fire protection and prevention for stored oil, Mr. Bowie.

Recovery of gasoline from natural gas by absorption, G. A. Burrell, chemist.

Compression methods of recovering gasoline from casing-head gas, W. P. Dykema, assistant petroleum engineer.

Engineering features and practical details of the recovery of gasoline from natural gas by absorption, Mr. Dykema.

The "topping" of oil, J. M. Wadsworth, assistant petroleum engineer.

The Diesel engine, its fuel and operation, Herbert Haas, consulting engineer.

Gas-separating traps, W. R. Hamilton, consulting engineer.

Analyses, testing of oils and products for Bureau of Mines, United States Geological Survey, Post Office Department, Panama Canal, Quartermaster's Department of the Army, and other Government establishments; W. A. Jacobs, assistant organic chemist; S. M. Brown, analyst; C. R. Bopp, laboratory assistant.

Motor gasoline, properties, testing methods, and specifications, E. W. Dean, organic chemist.

Investigation of methods of testing for unsaturated hydrocarbons in petroleum products for the purpose of differentiating between cracked petroleum products and others, Mr. Dean and H. H. Hill, assistant organic chemist.

Analytical distillation of petroleum, W. F. Rittman, consulting chemist, and Mr. Dean.

Physical and chemical properties of the commercial gasolines sold in 1915, Messrs. Rittman, Jacobs, and Dean.

Further investigation of the cracking of oils by a vapor-phase process and of the Rittman cracking process, Messrs. Dean and Jacobs.

Methods for the laboratory distillation of high-boiling and emulsified petroleums and products, Messrs. Dean and Hill.

Investigation of oil shales, D. T. Day, consulting chemist, W. E. Perdew, assistant chemical engineer, and Mr. Bopp.

Cooperation in commercial application of Rittman process, Dr. Day and Clarence Netzen, assistant chemical engineer.

Testing of fuels for internal-combustion engines, Mr. Netzen.

Bibliography of the petroleum industry, Miss E. W. Burroughs, editorial assistant.

METALLURGICAL DIVISION.

The metallurgical division is under the supervision of F. G. Cottrell, chief metallurgist, with headquarters at Washington. The investigations of this division and the officials in direct charge were as follows:

Smelter fumes, including recovery and utilization of sulphur and other substances, A. E. Wells, metallurgist, under the direct supervision of the chief metallurgist.

Hydrometallurgy of gold and silver ores, G. H. Clevenger, consulting metallurgist.

Mining and milling methods at lead and zinc mines, C. A. Wright, assistant metallurgical engineer.

Investigation of the flotation process, O. C. Ralston, assistant metallurgist.

Treatment of low-grade and complex ores, especially lead and zinc ores in the State of Utah, in cooperation with the University of Utah, Mr. Wells.

Safety and efficiency at blast furnaces, F. H. Willcox, metallurgical engineer.

Recovery of quicksilver from its ores, L. H. Duschak, chemical engineer.

Treatment of low-grade and complex copper ores, C. E. Van Barneveld, supervising mining engineer and metallurgist.

Concentrating processes for the treatment of low-grade and complex ores, Thomas Varley, assistant metallurgist.

Electrometallurgical treatment of low-grade and complex ores, F. C. Ryan, assistant electrometallurgist.

Recovery of potash from mill tailings, Mr. Wells.

Investigation of blast-furnace slags, A. L. Feild, assistant metallurgical engineer.

CHEMICAL-RESEARCH LABORATORY.

The chemical-research laboratory at Pittsburgh is under the supervision of C. L. Parsons, chief chemist.

At this laboratory, in addition to a large amount of routine work for investigations conducted by other divisions, the following special investigations were carried on:

By-product coking; manufacture of nitric acid by nitration of ammonia, Mr. Parsons, J. D. Davis, chemist, G. C. Taylor, assistant explosives chemist, and J. H. Capps, junior fuel chemist.

Properties of coal dust and of rock dust, Reinhardt Thiessen, assistant chemist.

Investigation of mine gases and of natural gas, A. C. Fieldner, chemist.

Clinkering of coal and fusing temperature of coal ash, Mr. Fieldner.

OTHER INVESTIGATIONS.

A number of investigations and inquiries that have been conducted for various periods of time under the immediate supervision of the director do not fall within any of the divisions mentioned. These investigations are as follows:

Iron mining in the United States, D. E. Woodbridge, consulting mining engineer.

Development of iron making in the United States, J. L. W. Birkinbine, consulting metallurgical engineer.

Gold dredging and placer mining, Hennen Jennings and Charles Janin, consulting mining engineers.

Metallurgical practice in the United States, C. H. Fulton, consulting metallurgist.

Sampling and assaying methods, T. R. Woodbridge, Edward Keller, and W. J. Sharwood, consulting metallurgical chemists.

Mine and fuel economics, A. G. White, associate mine economist.

WORK OF THE NEW EXPERIMENT STATIONS.

The Secretary of the Interior during the year designated Tucson, Ariz., Seattle, Wash., and Fairbanks, Alaska, as sites of three of the ten experiment stations to be established under the terms of the act of Congress, approved March 3, 1915 (40 Stat., 969).

It will be the duty of these stations, which are under the Bureau of Mines, to investigate the mining and metallurgical problems that are of most importance to the districts served, and their work will be coordinated with reference to other work being done by the Bureau of Mines and with regard to the needs of the mineral industries of the country. After the stations had been established, the remainder

of the year was given chiefly to the organization of a staff, to a survey of the problems that each station could attack most advantageously, to making arrangements for laboratory and other accommodations, and to obtaining necessary equipment.

TUCSON STATION.

On December 16, 1916, C. E. Van Barneveld was appointed supervising mining engineer and metallurgist in the Bureau of Mines and took immediate charge of the work of the station at Tucson, Ariz. During the second half of the fiscal year Prof. Van Barneveld made a general survey of the mineral resources and metallurgical problems of the mining camps in the region to be served, which includes Arizona, southwestern New Mexico, and southeastern California. The Arizona ores are chiefly gold and copper bearing, but there is an important lead-zinc district in Mohave County. Arrangements have been made with various mine operators for the shipment of representative lots of ores for a few experimental tests.

The station is housed in buildings belonging to the University of Arizona. Provision is being made for a chemical laboratory, an electrical laboratory, an ore-dressing laboratory, an assay-furnace room, and a general metallurgical laboratory. The equipment selected includes metallurgical apparatus to handle roasting, leaching, and concentration tests of ores in lots of 100 pounds to several tons.

The technical staff of the station now comprises C. E. Van Barneveld, supervising mining engineer and metallurgist; E. S. Leaver, assistant metallurgist; and G. E. Postma, junior chemist.

SEATTLE STATION.

D. A. Lyon, metallurgist of the Bureau of Mines, who had been in charge of the station at Salt Lake City, was appointed superintendent of the Seattle (Wash.) station in December, 1916. Suitable housing facilities, provided by the University of Washington, were ready by January 1, 1917, and the remainder of the fiscal year was given to organizing the work of the station and assembling a staff.

Coal mines in Washington and Oregon were visited for the purpose of studying the methods used in mining coal and preparing it for market in order to obtain data for planning a coal-washing laboratory especially suited to studying methods of beneficiating coals of the Pacific Northwest and of Alaska and for planning a laboratory for studying the best methods of burning the washed coal.

Because the region to be served contains abundant water power that can be utilized by hydroelectric plants, electrometallurgical processes

will receive especial attention at the Seattle station. Among the investigations planned are these: The electrometallurgy of the ores of the more important metals, except iron, with especial reference to the treatment of complex ores of lead, zinc, and copper for the purpose of separating and recovering all three metals; the recovery of gold, platinum, and rare metals (such as palladium) from the black sands of the Pacific coast, and the possibility of utilizing the black sands as a source of iron; an investigation of the possibility of recovering, at a profit, tin, zinc, and iron from scrap tin (such as old tin cans) and scrap galvanized iron. Metal-mining districts in the States of Washington, Oregon, and Idaho are being visited in order to determine what problems of ore treatment can advantageously be investigated at the Seattle station.

The present staff of the station comprises Thomas Varley, ore-dressing engineer, superintendent of the station; G. W. Evans, coal-mining engineer; W. H. Coghill, metallurgist; F. C. Ryan, electrometallurgist; C. E. Williams, assistant electrometallurgist; and H. A. Depew, assistant chemist.

FAIRBANKS STATION.

J. A. Davis, mining engineer, was appointed superintendent of the station at Fairbanks, Alaska, on August 1, 1916. Shortly afterward Mr. Davis made a trip to Fairbanks in order to study the needs of the region to be served by the station, make necessary arrangements for quarters, and determine the scope of the work that can be done most advantageously at Fairbanks.

As the station was not started until near the close of the season for shipment to the interior of Alaska, the obtaining of needed supplies and material had to be delayed until the following season. In March, 1917, Mr. Davis went to Seattle and arranged for the purchase of necessary supplies and equipment for the station, including machinery for an ore-testing laboratory and a chemical and assay laboratory. Approximately 85 per cent of this equipment was shipped from Seattle before the close of the fiscal year on June 30, 1917; the remainder was to be shipped during July.

At Fairbanks the equipment will be placed in quarters furnished by the Commercial Club of Fairbanks, and the station will be opened for work as soon as possible.

The staff of the station will include, besides the superintendent, a metallurgical engineer, an assistant analytical chemist and metallurgist, and a chief clerk.

Among the more important investigations to be conducted through the Fairbanks station are the development of more efficient methods

of working frozen placer ground; the milling and metallurgical treatment of gold and copper ores, the mining and concentration of tin ores; and the application of hydroelectric power in the mineral industries of Alaska.

PROGRESS OF INVESTIGATIONS.

MINING DIVISION.

RESCUE AND FIRST-AID INVESTIGATIONS AND TRAINING WORK.

The duties of the engineers, foreman miners, and first-aid miners engaged in first-aid work consisted chiefly in rendering aid at mine disasters, in training miners in rescue and first aid, and in conducting first-aid and mine rescue field contests.

Because of their condition, five of the old Pullman cars being used as rescue cars had to be extensively repaired. These cars were practically idle in September, and in October went to the repair shop in Chicago. In May, 1917, the three new specially designed all-steel cars, authorized by Congress, were placed in active operation. They are known as cars 1, 2, and 5 with headquarters at Reno, Nev., Raton, N. Mex., and Butte, Mont. Cars 3, 4, 6, 7, and 8 were returned from the repair shop in April and May in good order. Their headquarters are Evansville, Ind., Pittsburg, Kans., Pittsburgh, Pa., Ironwood, Mich., and Huntington, W. Va. From September 16 to May 17, seven and one-half months, the training work was done by men on detached duty. Although the results were excellent, the work was seriously handicapped at times by the lack of quarters and of apparatus and material needed. The training done by the stations and the three rescue trucks continued as usual.

During the fiscal year, 36,211 miners visited the cars, stations, and trucks; 39,258 attended lectures and safety demonstrations; 4,218 were given first-aid instruction; 1,394 were given rescue training, of whom 784 received first-aid training also, the total number trained being 4,828.

An important duty of the men engaged in this work is to inspect the rescue apparatus owned by mining companies, and to advise, when requested, on its condition or on the repairs needed. Frequently the apparatus examined is so defective that, if used in an irrespirable atmosphere at the time of an emergency or disaster, it would probably cause the death of the wearer. The field men always warn operators of such defects and emphasize the need of having the apparatus examined and tested monthly.

Details of the instruction, training, and demonstrations given by the foreman miners and the first-aid miners are shown in the following tables:

Training record for year ended June 30, 1917.

Car or station.	Number of visitors.	Attendance at lectures.	Number of miners fully trained.			Total.
			In mine rescue only.	In first aid only.	In mine rescue and first aid.	
CARS.						
Car 1 (old)			49		29	78
Car 1 (new)	1,131		44	222		266
Car 2 (new)	409	130		25	10	35
Car 3	2,593	1,412	40	169	4	213
Car 4	13,557	28,502	15	145	37	197
Car 5	280		18	17		35
Car 6	1,625	700	65	215	40	320
Car 7	31		12	43	5	60
Car 8	1,537	416	8	30	16	54
STATIONS.						
Pittsburgh, Pa	324	143	31	119	33	183
Jellico, Tenn	2,110	2,995	2	92	116	210
Birmingham, Ala	10,807	5,030	8	44	59	111
Seattle, Wash	1,245	3,614	41	104	26	171
McAlester, Okla	512	731	5	116	9	130
Detached men			272	2,093	400	2,765
Total	36,211	39,258	610	3,434	784	4,828

Training record by months for year ended June 30, 1917.

Month.	Number of miners fully trained.			Total.
	In first aid only.	In mine rescue only.	In mine rescue and first aid.	
1916.				
July	192	37	78	307
August	107	44	27	178
September	78	35	26	139
October	140	1	42	183
November	165	65	75	305
December	334	68	81	483
1917.				
January	286	12	35	333
February	465	29	78	572
March	513	60	132	705
April	263	33	80	376
May	232	92	47	371
June	659	134	83	876
Total	3,434	610	784	4,828

STATES AND TOWNS AT WHICH MINE RESCUE AND FIRST-AID TRAINING WAS GIVEN BY BUREAU OF MINES MEN FOR YEAR ENDING JUNE 30, 1917.

Alabama.—Acton, Benoit, Bessie Mines, Cardon Hill, Garnsey, Margret, Marvel, Townley.

Arkansas.—Denning, Hartford, Hartman, Huntington.

California.—Grass Valley, Kennett.

Colorado.—Colorado Springs, Denver, Frederick, Golden, Gray Creek, Hastings, Lafayette, Leyden, Mount Harris, Oak Creek, Pikeview.

Idaho.—Burke, Kellogg, Mace, Mullen.

Illinois.—Benton, Urbana.

Indiana.—Bicknell, Boonville, Bruceville, Chandler, Evansville, Fort Branch, Princeton, Shelburn, Vincennes, Winslow.

Iowa.—Brazil, Buxton, Centerville, Cincinnati, Exline, Jerome, Maple, Numa, Spring Hill, Sunset, Whiteburg.

Kansas.—Arma, Blue Rapids, Breezy Hill, Coalvale, Croweburg, Fleming, Franklin, Frontenac, Mineral, Mulberry, Pittsburg, Radley, Ringo Junction, Yale.

Kentucky.—Aflex, Ages, Bland, Blue Diamond, Chenoa, Coxton, Fleming, Glomawr, Grays Knob, Hardy, Harlan, Hazard, Jackhorn, Kettle Island, Kitts, McCarr, McVeigh, Mountain Ash, Seco, Stearns, Stone, Straight Creek, Thealka, White Star.

Michigan.—Alpha, Gwinn, Hancock, Iron River, Ishpeming, Palatka, Palmer, Negaunee, Republic.

Missouri.—Bevier, Bonne Terre, Carterville, Duenweg, Huntsville, La Motte, Leadwood, Marceline, Minden Mines, Porto Rico, Prosperity, River Mines, St. Francois Mine, Waverly, Webb City.

Montana.—Anaconda, Billings, Butte, Chandler, Klein, Roundup, Silverbow, Washoe.

Nevada.—Aurora, East Ely, Ely, Goldfield, McGill, Millers, Ruth, Tonopah.

New Jersey.—Franklin, Perth Amboy.

Oklahoma.—Acme, Alderson, Degnan, Haileyville, Huntington, Lehigh, McAlester, McCurtain, Red Oak, Wilburton.

Ohio.—Cleveland.

Pennsylvania.—Adams, Alden Station, Arcadia, Archbald, Atlasburg, Barnesboro, Beaverdale, Beaver Meadows, Boswell, Brady, Bruceton, Buck Run, Burgettstown, Carbondale, Castle Shannon, Chauncey, Clymer, Columbia, Colver, Dark Water, Dudley, Duncott, Dunkelbergers, Excelsior, Greensburg, Hastings, Hazelbrook, Hopewell, Horning, Hudson, Johnstown, Large, Leviston, Mahanoy Plane, Maryd, Meadowland, Miles, Mocanaqua, Mollonauer, Moosic, New Boston, New Castle, Osceola Mills, Orient, Phillipsburg, Pine Hill, Pittsburgh, Plymouth, Portage, Primrose, Robertsdale, Rockwood, Sandy Run, Scranton, Shickshinny, Six Mile Run, St. Benedict, Spangler, Storford, Uniontown, Upper Lehigh, Wendel, West Nanticoke, Wilburton, Winburne.

South Dakota.—Lead.

Tennessee.—Jellico, La Follette, Rockwood.

Washington.—Bayne, Beekman, Black Diamond, Burnett, Carbonado, Cumberland, New Castle, Renton, Seattle, Wilkeson.

West Virginia.—Black Betsey, Eccles, Edgarton, Glen White, Huntington, Morgantown, Page.

Wyoming.—Carneyville, Cheyenne, Crosby, Dietz, Gebo, Kooi, Monarch.

District of Columbia.—Washington.

RESCUE AND RECOVERY WORK AFTER MINE EXPLOSIONS AND FIRES.

During the past year the value of oxygen breathing apparatus, both for rescue and recovery work after explosions and for fighting mine fires, has been shown on numerous occasions. The use of such apparatus has increased both in the coal fields of the East and in the metal-mining districts of the West.

The possibilities and also the limitations of the existing types of apparatus are being much more generally understood; recovery and rescue work after mine disasters is becoming largely systematized. At 19 of the 63 mining and other accidents investigated during the past fiscal year by bureau representatives, rescue apparatus (owned privately or by the Government) was worn during recovery and rescue work. There were two fatalities, one of a Bureau of Mines engineer, L. M. Jones, and one of an employee of a mining company. Bureau men wore apparatus for recovery and rescue purposes on 12 occasions.

ACCIDENTS IN WHICH LIVES WERE SAVED

Summarized accounts of accidents at which lives were saved are given below:

JULY 11, 1916, EXPLOSION IN THE HITCHMAN MINE, BENWOOD, W. VA.

No one killed. There were 260 men in the mine, 11 of whom were injured; all except 1, who was thrown off his motor by the explosion and burned, were able to walk out of the mine.

JULY 24, 1916, EXPLOSION IN THE NEW WEST SIDE WATER TUNNEL UNDER LAKE ERIE, CLEVELAND, OHIO.

After a gas explosion in this tunnel the crib superintendent and four men entered the tunnel in an attempt to save men who had been at work. After going 100 feet they were overcome by afterdamp and dropped. Two men left at the lock near the tunnel entrance saw the superintendent drop; they dragged him to fresh air, where he revived, but the two men were made so weak by the afterdamp that they were unable to rescue the others, and subsequently all three, while in fresh air outside the tunnel, became unconscious for two hours. In the meantime the general superintendent and 7 men who entered the tunnel were overcome and lay untouched for about five hours. Then the tunnel air lock was broken and the pressure released. Subsequently it was found that the tunnel had caved when the explosion occurred. The superintendent and one other man had fallen near a three-fourth-inch hole in an air pipe and had been getting some fresh air. They revived and walked through the lock unassisted. The other men in the tunnel were dead.

SEPTEMBER 6, 1916, EXPLOSION IN NO. 2 MINE, UNITED COAL MINING CO., BUCKNER, ILL.

Gas was ignited by miners in old workings. The explosion blew out or damaged eight stoppings and three doors, but no one was injured. Between 30 and 40 men in the explosion area could not get out on account of the smoke. The company inspector, Mr. Laughron, who took charge of the rescue work, succeeded in about a half hour in restoring ventilation by temporary canvas brattices, so that the men could get to safety.

SEPTEMBER 23, 1916, CAVE-IN, BUFFALO MINE, WYOMING COAL CO., BUFFALO, WYO.

A cave-in liberated gas accumulating in old workings and trapped 2 miners, who escaped to an air shaft after putting up several brattices to hold gas back. They were hoisted to the surface by means of ropes.

OCTOBER 2, 1916, CLEVELAND WATERWORKS TUNNEL, CLEVELAND, OHIO.

Mr. Farrell, Director of Public Utilities of Cleveland, after making an inspection of the Cleveland waterworks tunnel, collapsed in the airlock while "locking out." W. J. German, safety engineer of the tunnel, on furlough from the Bureau of Mines, immediately started artificial respiration by the Schaefer method, and after half an hour's work brought him back to consciousness.

OCTOBER 22, 1916, EXPLOSION AT MARVEL NO. 2 MINE, RODEN COAL CO., MARVEL, ALA.

One man, a pumper, escaped with slight burns from this explosion. He crawled up the slope to within a few hundred feet of the mouth and was there met by rescuers without apparatus, who assisted him out.

NOVEMBER 4, 1916, EXPLOSION AT THE BESSIE MINE OF THE SLOSS-SHEFFIELD STEEL & IRON CO., MABEN, ALA.

After the explosion the mine was explored by men wearing breathing apparatus. About 15 hours after the explosion a trained apparatus crew of 5 men found 3 men at a break in the air line. The party was then about 1,000 feet from fresh air, and the three men were able to proceed to safety with the aid of the apparatus crew. Thirty men were killed by the explosion, 5 escaped unassisted, and 3 were rescued as noted.

DECEMBER 15, 1916, EXPLOSION IN NO. 5 MINE OF DEGNAN & MCCONNELL COAL CO., WILBURTON, OKLA.

Two shot firers, the only men in the mine at the time, lost their lives. Immediately after the explosion 4 men without apparatus who attempted to enter the mine through an old slope, were overcome before proceeding far; in getting them out 8 others (all without apparatus) were overcome. Eleven of the 12 were revived by the prompt administration of artificial respiration given by bureau-trained men; 1 man died in spite of all efforts to revive him. One of those revived had been unconscious for 6 hours.

DECEMBER 13, 1916, EXPLOSION, NO. 9 MINE, FIDELITY COAL & MINING CO., STONE CITY, KANS.

Twenty men were killed, 36 escaped unassisted, and 11 were partly overcome by afterdamp and were helped to safety by local men.

JANUARY 3, 1917, FIRE AT THE PITTSBURGH-IDAHO LEAD-SILVER MINE, GILMORE, IDAHO.

Fire starting, it is said, from the ignition of a can of gasoline caused the death of 1 man and the imprisoning of 14 other men; 8 of these bulkheaded themselves in the dead end of a drift. The other 6 went into the dead end of another drift, but built no bulkhead. All 14 were rescued 12 hours after the fire started; apparently the mine air was then not bad, as the rescue was made by local men without rescue apparatus, led by Superintendent Ellard.

JANUARY 25, 1917, FIRE AT PRIMROSE COLLIERY, LEHIGH VALLEY COAL CO., NEAR MAHANOY CITY, PA.

Nine men wearing apparatus of a helmet type were overcome while exploring a fire area. Superintendent Wolfe, wearing no apparatus, was also overcome, but not before he had given orders to reverse the air. It was then possible to save all the men without the use of apparatus.

FEBRUARY 19, 1917, EXPLOSION AT NO. 15 MINE, WESTERN COAL & MINING CO., FRANKLIN, KANS.

Of 3 shot firers in the mine, 2 were killed; the third traveled 3,700 feet by himself over falls to the bottom of the shaft, where oxygen was administered to him. A couple of days afterwards the man showed no ill effects from his experience.

FEBRUARY 23, 1917, FIRE IN THE LEONARD MINE OF THE ANACONDA COPPER MINING CO., AT BUTTE, MONT.

Mr. Boardman, formerly with the Bureau of Mines, in charge of rescue apparatus for the company, entered the mine. He took three sets of apparatus down with him on the cage to the 900-foot station. In the 900-foot level, at the end of the gaseous area, while wearing apparatus, he met the mine foreman crawling; about 100 feet farther in he saw a man partly overcome and assisted him to the shaft. Again entering the 900-foot level he met, at a point 250 feet from the shaft, another man crawling and assisted him to the shaft. These two men probably owed their lives to this assistance. Boardman then caused a man who had never worn apparatus to put on apparatus and accompany him to the manway in which a man overcome had been left with a rope attached to him. The man's light was found burning and Boardman's assistant held the rope on the 900-foot level while he went down into the raise through the two floors, placed the rope under the unconscious man's arms, and put the man into the timber chute. The man was brought to the level above, placed on a truck, and pushed to fresh air, a distance of 600 feet. The man was totally unconscious on reaching the station. Boardman and others used the Schaefer method of artificial respiration for 40 minutes before the man began to breathe; then the man was given oxygen; later he recovered completely.

MARCH 13, 1917, EXPLOSION AT HENDERSON NO. 1 MINE, HENDERSON COAL CO., HENDERSONVILLE, PA.

Of 38 men in the mine at the time of the explosion, 14 were killed and 22 escaped unassisted. Two, who were prevented by the smoke and afterdamp from reaching safety, crawled upon a fall where they remained until a rescue party without apparatus reached them some hours afterwards.

MARCH 19, 1917, EXPLOSION AT NO. 18 MINE OF THE CLEMENS COAL CO., NEAR PITTSBURG, KANS.

John Ferns, gas man, ignited a body of gas; he was severely burned and rendered unconscious. Mine foreman Keegan, James Ferns, and Marvin Sample entered the mine immediately. Sample, who had been trained in first aid by a Bureau of Mines representative, began artificial respiration on the injured man, who revived after about 15 minutes and was taken to the surface. The man died later as a result of his burns.

APRIL 27, 1917, EXPLOSION AT HASTINGS MINE, VICTOR AMERICAN FUEL CO., HASTINGS, COLO.

An explosion occurred resulting in the death of 121 out of 122 men known to be underground, the only survivor being a rope rider, who was going down the main slope on a trip of empty cars when the explosion occurred. The explosion disarranged and short-circuited the bell wires, thus causing a signal to be given to the hoist man on the surface, the latter stopping the trip. The rope rider endeavored to ascertain the cause of the bell-wire trouble and encountered smoke, whereupon he hastily proceeded to the surface. During the progress of the recovery work an apparatus wearer met his death, bringing the total number of casualties to 122. Although the explosion was violent inside, there was no indication at the mouth of the mine. The fan continued to run, and the only indication of any unusual condition was the fact that smoke issued from the main slope and south manway. It was thought that a fire had started and mine officials immediately started an investigation. The work of recovering the bodies was much delayed on account of numerous falls and consequent obstruction of ventilation and prevention of passage through the entries. In all, 101 bodies were recovered, 20 being left in the mine not found. Some of these may never be recovered, as there are innumerable falls, many of which may not be moved. The last bodies were taken out of the mine on May 12, or 15 days after the explosion. Although no accurate record was kept, it is thought that at least 50 of the 101 bodies recovered were brought to the fresh-air base by men wearing breathing apparatus. Apparatus was worn by local rescue crews and Bureau of Mines men. The cause of the explosion is doubtful.

JUNE 2, 1917, REND NO. 2 MINE, REND COAL & COKE CO., NEAR HERRIN, ILL.

Nine men were killed and 2 injured by an explosion of gas. Eight men wore apparatus for about 3 hours in mine exploration and recovery of bodies. One of the injured men was resuscitated.

JUNE 8, 1917, DISASTROUS FIRE AT GRANITE MOUNTAIN SHAFT, NORTH BUTTE MINES, BUTTE, MONT.

The oil-soaked insulating material of a lead-armored cable was ignited by a carbide lamp, the fire spreading rapidly to the shaft timbers and the mine. Some 214 or 215 of the miners escaped by another shaft and through communicating mines, but 201 were entombed. Of these, 25 men escaped two days later by a connecting shaft, after having bulkheaded themselves for more than 24 hours. A day later crews wearing apparatus rescued alive, but absolutely exhausted, 6 men who had bulkheaded themselves in the 2,200-foot level. Messrs. Harrington, Allen, Forbes, and Dickinson, of the Bureau of Mines, assisted in the rescue of these men. Apparatus was put on them and they were conveyed on trucks to fresh air. The remaining 170 men perished. In fighting the fire and in recovering the bodies 77 sets of rescue apparatus were used, worn by 119 men. Of the 151 bodies recovered, 125 were recovered by the use of apparatus. Cars 2 and 5 were called to the scene and the bureau employees were able to render aid promptly. Apparatus was in constant use for 5 days by the crews of the Anaconda Copper Co., the North Butte Co., and by the Bureau of Mines men present.

ACCIDENTS INVESTIGATED DURING THE YEAR.

The following table shows that 63 accidents were investigated by members of the Bureau of Mines during the fiscal year. In these

accidents 629 men were killed, 1,140 escaped unassisted, and 113 men were rescued through the efforts of volunteer miners, company officials, State mine inspectors, company rescue crews, and members of the bureau. Of the 629 men killed, 136 lost their lives in munitions-plant explosions. Of the 63 accidents investigated, 49 were in coal mines, 8 in metal mines, 3 in munitions plants, 1 in the Cleveland waterworks tunnel, 1 in railroad shops at Louisville, Ky., and 1 in a foundry at Pittsburgh, Pa.

The accidents may be classified by causes, as follows:

Classification of accidents investigated.

Gas and dust explosions	28	Misplaced or overcharged shots (includes shot-firers' explosions due to "shooting off solid")	8
Mine-car accidents	2		
Electric shock	1	Oxygen-tank explosion	1
Hoisting accidents	3	Suffocation from gas accumulation	1
Cave-in	1		
Gas-engine fumes	1	Unknown	2
Explosion of dynamite or other explosive	5	Coal rush	1
Fires	8	Boiler explosion	1

Accidents investigated in the fiscal year ended June 30, 1917.

Name of mine.	Location.	Date.	Killed.	Injured.	Rescued.	Escaped unassisted.	Number wearing breathing apparatus or apparatus used.	Total hours apparatus worn by all users.	Died wearing apparatus.	Nature of accident.	Investigated by—
		1916.									
Hitchman	Benwood, W. Va.	July 11	0	11	1	10	0			Gas explosion	W. B. Plank.
Prospect	Wilkes-Barre, Pa.	July 14	1	2			0			do	R. Y. Williams.
Cleveland tunnel	Cleveland, Ohio.	July 24	a 19		3	1	0			do	L. M. Jones, D. J. Parker, and W. J. German.
Shaft No. 9	Cresson, Pa.	July 28	2	14			0			Collision of trips, in runaway	E. H. Denny.
Springside	Pana, Ill.	July 30	4	2	0	2	0			Gas explosion	J. R. Fleming.
Woodward No. 3	Wilkes-Barre, Pa.	Aug. 8	6	1		3	0			do	Williams, J. J. V. Forbes, and R. H. Seip.
Colliery No. 6	Inkerman, Pa.	Aug. 9	2	2		3	0			do	Seip.
East Butte Copper Co.	Butte, Mont.		1				0			Electric shock	D. Harrington.
Diamond shaft	do		2	2			0			Hoisting engine	Do.
Butte & Superior Mining Co.	do		0	0			0			Skip fall, broken kingbolt	Do.
Edna No. 2	Wendel, Pa.	Sept. 2	0	0			10	1	0	Recovery of mine after fire	Plank, E. Steidle.
United Coal Co., No. 2 mine	Buckner, Ill.	Sept. 6	0	0	30	520	0			Explosion of gas	J. R. Fleming.
Buffalo	Buffalo, Wyo.	Sept. 23	0	0	2		0			Cave-in	H. J. Rahilly.
Jamison No. 7	Barrackville, W. Va.	Oct. 19	10	1	0		12	(b)	1	Gas explosion	Parker.
Eleanora	Punxsutawney, Pa.	Oct. 21	0	0			0			do	Steidle.
Marvel No. 2	Marvel, Ala.	Oct. 22	17	1	1	0	11	2	0	Dust and gas explosion	E. B. Sutton.
Beaver Hill No. 3	Marshfield, Oreg.	Oct. 31	3	2			0			Gas explosion	J. J. Corey.
Bessie	Mabel, Ala.	Nov. 4	30	0	c 3	5	26	(b)	0	Gas and dust explosion	Sutton.
Garrison Foundry Co.	Pittsburgh, Pa.	Nov. 17	0	2			0			Carbon monoxide from gas engine.	F. M. Seibert.
Loomis Colliery	Wilkes-Barre, Pa.	Dec. 1	2	1			0			Dynamite explosion	Seip, J. Henson.
Crown Hill No. 3	Clinton, Ind.	Dec. 9	2	0	0		0			Overcharged shot	H. I. Smith.
Johnson City Coal Co., No. 1 mine.	Johnson City, Ill.	Dec. 8	3	0			0			Return air carrying gases from mine fire.	J. R. Fleming.
Fidelity Coal Co., No. 9 mine.	Stone City, Kans.	Dec. 13	20	11	11	36	5	2	0	Gas explosion	J. J. Rutledge, Forbes.
Logan	Logan, Ill.	do	1	7	0	7	0			Gas ignition	H. I. Smith.
Holmes Shaft	Ishpeming, Mich.	Dec. 14	3	4			0			Shaft accident, frozen cross head.	A. A. Krogdahl.
New No. 5	Wilburton, Okla.	Dec. 15	d 3	e 11	11	0	6	2	0	Gas explosion	Rutledge, W. W. Fleming.
Bruceville	Vincennes, Ind.	Dec. 19	2	24		140	11	4	0	do	H. I. Smith, J. R. Fleming, G. T. Powell.

Accidents investigated in the fiscal year ended June 30, 1917—Continued.

Name of mine.	Location.	Date.	Killed.	Injured.	Rescued.	Escaped unassisted.	Number wearing breathing apparatus or apparatus used.	Total hours apparatus worn by all users.	Died wearing apparatus.	Nature of accident.	Investigated by—
		1916.									
Edgewater	Edgewater, Ala	Dec. 20	1	1	.....	.....	0	.....	.....	Powder explosion	W. T. Burgess.
Carlson Coal Co.	Osage City, Kans.	Dec. 28	2	0	.....	.....	0	.....	.....	Fire, incendiary	Forbes.
		1917.									
Pittsburgh & Idaho	Gilmore, Idaho	Jan. 3	1	0	14	.....	0	.....	.....	Fire	Rahilly.
Gebo	Gebo, Wyo	Jan. 9	0	0	.....	.....	0	.....	.....	....do	Harrington, Rahilly.
Central No. 45	Ringo, Kans	Jan. 16	1	0	.....	.....	0	.....	.....	Shot firer's explosion	Forbes.
Primrose	Mahanoy City, Pa	Jan. 25	0	10	*f* 10	.....	9	.....	0	Fire	Seip and Henson.
Central No. 6	Huntington, Ark	Feb. 1	2	3	.....	12	0	.....	.....	Shot firer's explosion	J. F. Davies, W. W. Fleming.
Rock Island No. 38	Alderson, Okla	Feb. 2	0	0	.....	.....	0	.....	.....	Dust explosion	Rutledge, Powell, W. W. Fleming.
Western Coal Co., No. 15 mine.	Franklin, Kans	Feb. 5	2	0	1	.....	18	26	0	Shot firer's explosion	Forbes.
East Bear Ridge	Mahanoy Plane, Pa	Feb. 8	3	0	0	0	0	.....	.....	Coal rush	Seip.
Leonard, West Colusa, tramway.	Butte, Mont	Feb. 23	1	.....	*g* 5	.....	*h* 44	(*i*)	0	Mine fire	Rahilly, Harrington.
Henderson	Hendersonville, Pa	Mar. 13	14	0	2	38	10	4	0	Gas and dust explosion	Denny, B. O. Pickard.
Fort Branch	Fort Branch, Ind	Mar. 15	0	0	0	105	0	.....	0	Gas ignition	Powell.
Adventure	Greenland, Mich	Mar. 16	2	0	0	2	0	.....	.....	....do	H. I. Smith.
Isabella	Isabella, Pa	Mar. 18	4	0	0	1	20	8	0	Gas and dust explosion	Steidle, W. F. Pyne.
Clements No. 18	Pittsburg, Kans	Mar. 19	1	0	*j* 1	0	.....	.....	.....	Gas ignition	Forbes.
Central No. 6	Huntington, Ark	Mar. 27	2	0	0	0	10	2	0	Shot firer's explosion	Rutledge, W. W. Fleming, Davies.
Erie Canal coal mine	Evansville, Ind	Apr. 3	1	5	.....	.....	.....	.....	.....	.....	Powell.
Robindale	Robindale, Pa	....do	3	0	0	0	10	2	0	Gas and dust explosion	Plank, Denny, L. C. Ilsley.
Bell and Zoller No. 1	Zeigler, Ill	Apr. 4	1	0	.....	.....	0	.....	.....	Haulage accident	J. R. Fleming.
Weir No. 17 mine	Dunkirk, Kans	Apr. 6	1	0	.....	.....	0	.....	.....	Shot firer's explosion	Forbes.
Old Ben Corp. No. 8	West Frankfort, Ill	Apr. 10	1	0	.....	.....	.....	.....	.....	Boiler explosion	J. R. Fleming.
Sunbeam	Terre Haute, Ind	Apr. 16	1	0	.....	.....	0	.....	.....	Blown-out shot	Do.
Louisville & Nashville R. R. shops.	Louisville, Ky	Apr. 18	3	.....	.....	.....	0	.....	.....	Explosion of oxygen tank	J. W. Paul.
Wingate	Carbonado, Wash	Apr. 19	1	0	.....	.....	.....	.....	.....	Suffocation by gas	Corey.
Hastings	Hastings, Colo	Apr. 27	121	0	0	1	*h* 21	4	1	Probably a gas explosion	Harrington.
South	Lincoln, Ill	May 9	1	1	0	1	0	.....	.....	Gas ignition	J. R. Fleming.
Saline No. 6	Grayson, Ill	May 12	4	0	0	5	5	1	0	Probably a gas ignition	Do.
Rend No. 2	Herrin, Ill	June 2	9	2	2	9	8	3	0	Gas ignition	Do.

Speculator or Granite Mountain.	Butte, Mont.	June 8	170	.....	c 6	238	119 h 77	(b)	0	Fire	Harrington.
Savanna No. 5	Savanna, Okla.	...do	1	0						Unknown	
Banner	Littleton, Ala.	June 15	6	4	.....	1	0	.....	.....	Gas ignition	Sutton and Burgess.
Vandalia No. 17	10 miles west of Linton, Ind.	June 23	2	0	.....	.....	0	.....	.....	Gas explosion	J. R. Fleming.
Munitions plants.		1916.									
Black Tom Island	Jersey City, N. J.	July 30	5	0	.....	.....	.....	.....	.....	Explosion of 2,881,442 pounds of explosive.	C. E. Munroe, S. P. Howell.
E. I. du Pont de Nemours & Co.	Haskell, N. J.	1917. Jan. 12	2	9	.....	.....	.....	.....	.....	Explosion of 461,627 pounds smokeless powder.	Howell.
Eddystone Ammunition Corp.	Eddystone, Pa.	Apr. 10	129	121	10	.....	.....	.....	.....	Explosion of 2,000 pounds explosive.	C. E. Munroe, Howell.
Total (July to December, 1916).	.....	.....	136	99	62	727	81	(k)	1		
Total (January to June, 1917).	.....	.....	495	155	51	413	274	(k)	1		
Grand total	.....	.....	**631**	**255**	**113**	**1,140**	**356**	(k)	**2**		

a Includes 6 rescuers.
b Apparatus used for several days.
c Rescued by apparatus men.
d Includes 1 rescuer.
e Rescuers overcome.
f Nine rescuers, with helmets, overcome.
g One man rescued and 4 others taken to safety by men wearing apparatus.
h Sets.
i 1,061½. Eight-hour working shifts by apparatus men using oxygen much of the time.
j Revived by artificial respiration but afterwards died from burns.
k Estimate not possible.

ACCIDENTS INVESTIGATED SINCE 1907.

The following table shows the number of accidents investigated during each calendar year since Government investigations of mine accidents began in 1907:

Accidents investigated by Bureau of Mines and number of persons killed and rescued, 1907 to 1917.

Item.	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	Jan. 1 to June 30, 1917.
Number of accidents investigated	12	16	25	25	35	47	73	65	92	62	33
Number killed	1,106	445	574	722	663	334	634	440	452	259	493
Number rescued by Bureau of Mines men	.....	2	29	20	13	7	19	2	a 43	1	5
Number rescued by others	21	16	124	243	81	84	106	26	111	66	46
Number who escaped unassisted	5	33	403	132	18	117	100	1,127	2,392	1,544	413

aIncludes 42 miners at Layland, W. Va., rescued jointly by Gary (W. Va.) crew, State inspectors, company officials, volunteer crews, Bureau of Mines crew.

The accidents investigated during the year were in 18 States, as follows: Alabama, 4; Arkansas, 2; Colorado, 1; Idaho, 1; Illinois, 9; Indiana, 6; Kansas, 6; Kentucky, 1; Montana, 5; Michigan, 2; New Jersey, 2; Ohio, 1; Oklahoma, 3; Oregon, 1; Pennsylvania, 14; Washington, 1; West Virginia, 2; Wyoming, 2.

A tabulation of the number of accidents investigated from January 1, 1907, to June 30, 1917, classified by States, is given below:

Number of mine disasters or serious accidents investigated, by States, 1907–1917.

State.	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	Jan. 1 to June 30, 1917.	Total.
Alabama	1	.....	1	3	1	2	2	3	2	4	1	20
Arizona	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
Arkansas	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	2	4
California	.....	.....	.....	.....	.....	.....	1	1	1	7	.....	10
Colorado	1	.....	.....	5	4	6	4	2	1	.....	1	24
Idaho	.....	.....	.....	.....	1	2	1	.....	.....	.....	1	5
Illinois	2	4	7	2	.....	2	1	4	9	6	4	41
Indiana	.....	.....	2	1	1	2	9	7	12	4	4	42
Iowa	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
Kansas	.....	.....	.....	.....	1	4	4	10	10	5	4	38
Kentucky	.....	.....	1	4	1	3	5	2	1	.....	1	18
Maryland	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Michigan	.....	.....	.....	.....	2	1	4	4	1	2	1	15
Minnesota	.....	.....	.....	.....	.....	.....	1	1	1	.....	.....	3
Missouri	.....	.....	.....	.....	1	.....	.....	2	3	1	.....	7
Montana	.....	.....	.....	.....	1	.....	.....	1	2	4	2	10
Nevada	.....	.....	.....	.....	2	.....	.....	1	.....	1	.....	4
New Jersey	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	2	3
New Mexico	1	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	2
New York	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1
Ohio	.....	.....	1	1	1	1	4	1	.....	1	.....	10
Oklahoma	.....	2	3	4	5	9	5	7	10	2	2	49
Oregon	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Pennsylvania	2	6	6	2	6	10	24	10	25	16	6	113
Tennessee	.....	.....	1	.....	1	.....	1	2	.....	.....	.....	5
Utah	.....	.....	.....	.....	.....	.....	.....	1	2	.....	.....	3
Virginia	.....	.....	.....	1	1	1	.....	.....	1	.....	.....	4
Washington	.....	.....	1	2	2	.....	1	.....	2	.....	1	9
West Virginia	5	3	2	.....	4	3	2	5	7	4	.....	35
Wyoming	.....	1	.....	.....	.....	1	.....	.....	.....	3	1	6
Total	12	16	25	25	35	47	73	65	92	62	33	485

FIELD CONTESTS IN MINE RESCUE AND FIRST-AID METHODS.

The mine rescue and first-aid contests and field meets held during the past year at which Bureau of Mines employees were present are listed below. Some of these were company affairs, others intercompany and interstate. In some of these contests the Bureau of Mines employees arranged and supervised and gave competing teams special instruction and training.

First-aid and mine rescue contests held during the fiscal year ended June 30, 1917.

Date.	Place.	Kind of contest.		Number of teams.		Number of spectators.	Nature of contest.
		First aid.	First aid and mine rescue.	First aid.	Mine rescue.		
1916.							
July 4	Big Stone Gap, Va	1		16		3,000	Interstate.
July 8	Clearfield, Pa	1				1,000	Intracompany.
July 22	Cresson, Pa	1		39		4,000	Interstate.
July 1	Hastings, Pa	1		15		1,000	Intracompany.
Sept. 1	Barnesboro, Pa		1	14	2	8,000	Intracompany.
Sept. —	Cresson, Pa	1		6			Elimination.
Sept. 9	Spring Valley, Ill	1		15			State-wide.
Sept. 30	Price, Utah		1	6	4		
Oct. 21	Jasper, Ala		1	6	2	5,000	Intercompany.
Oct. 29	Jellico, Tenn	1		13		2,000	Interstate.
Nov. 2	Sullivan, Ind	1		7			
1917.							
Jan. 12	Archbold, Pa	1		4		300	Intracompany.
Apr. 1	Wilkeson, Wash	1		2			Local unions.
Apr. 11	Garnsey, Ala	1		4		150	Intracompany.
Apr. 12	Marvel, Ala	1		4		200	
Mar. —	Spangler, Pa	1		6		100	
May —	Grass Valley, Cal		1	1			Test.
May 12	Huntington, Ark	1		5			State-wide.
May 19	McAlester, Okla	1		8			Do.
May 26	Huntsville, Iowa	1		6		500	Do.
June —	Tonopah, Nev		1	1		400	Demonstration.
June —	Goldfield, Nev		1			500	Do.

TESTS OF BREATHING APPARATUS.

During the year the Bureau of Mines continued tests of breathing apparatus for use in noxious atmospheres, with the object of devising improvements in design that would increase the safety of wearers.

Some of the commercial oxygen used in rescue apparatus has contained as much as 3 per cent nitrogen and 1.3 per cent hydrogen. These gases are not absorbed in the lungs, and consequently when the apparatus is used, the proportion in the artificial atmosphere supplied to the wearer gradually increases. The bureau's investigations show that where oxygen is mixed with more than 2 per cent of hydrogen there is danger that at the end of two hours, the period for which the oxygen lasts, the air in circulation may contain an explosive mixture. Owing to the difficulty of procuring electrolytic oxygen that will always be of a greater purity than this, the bureau

has temporarily discontinued the use of electrolytic oxygen for mine rescue apparatus.

To complete this investigation 16 tests were made during the year, each of two hours' duration, with Gibbs, Fleuss, Draeger, and Westfalia apparatus. Incidentally, these tests showed that the regenerating cartridge used in the Gibbs apparatus, generally speaking, removed practically all of the carbon dioxide in the breath of the wearer. In this important respect the Gibbs apparatus was far superior to the other types tested; men when wearing the Gibbs apparatus while doing hard work had much lower pulse and respiration rates than when wearing the other apparatus.

Three tests were made with the Gibbs apparatus to determine the efficiency of the regenerator at freezing temperatures. These demonstrated that if the caustic soda used is exposed to low temperatures for a while, it does not remove carbon dioxide nearly as rapidly as when warm; consequently, caustic soda that has been exposed to low temperatures should be brought to ordinary room temperature before it is used in the apparatus. The mica valves of the apparatus gave some trouble by freezing in a shut or open position at temperatures near 0° F.

Two short tests of the Gibbs apparatus were made with the regenerator filled with a soda-lime mixture in place of caustic soda alone. As it is believed that a soda-lime combination will prove satisfactory for the regenerators of rescue apparatus, the bureau is to continue experiments, for the soda lime is considerably cheaper than soda.

As the result of tests made during the year, some minor changes were made in the Gibbs apparatus and a contract was let for the manufacture of 25 sets. They will be delivered during 1917 and will receive a thorough test in the field training service.

Eight tests with the Fleuss half-hour, or "Salvator," type of apparatus using the largest type of regenerator, showed that men wearing this apparatus could do as much work in a given time as they could with the much heavier 2-hour type, and although the regeneration of air was hardly as efficient, yet it was satisfactory. None of the men wearing the half-hour apparatus with large regenerator suffered any inconvenience while doing hard labor. Samples of the air breathed by the wearers contained 3 to 4 per cent carbon dioxide, but these samples contained equal proportions of inhaled and exhaled air, because the wearer inhales and exhales through the same tube. By collecting the air sample only at inhalation several fairly representative samples of the inhaled air were obtained; they contained 1 to 2 per cent carbon dioxide. With this apparatus the inhaled air becomes warm near the close of a half-hour period.

Both the Draeger and the Fleuss apparatus are now being made in this country. In design and workmanship the American-made Draeger seems to equal, and possibly surpass, the German-made Draeger.

PERSONNEL OF RESCUE CARS AND STATIONS.

D. J. Parker, mine-safety engineer, with headquarters at Pittsburgh, Pa., is in charge of mine-rescue operations and of the testing of all apparatus. H. M. Wolflin, who was formerly in charge of this work, was succeeded by Mr. Parker in December, 1916. Mr. Parker was assisted by B. O. Pickard, metal-mining engineer, and by J. W. Koster, assistant mining engineer. Mr. Koster is in charge of all work relating to the testing of rescue apparatus and of mechanical resuscitating devices.

In order to assure efficient administration of the mine safety work conducted by the bureau, the country is for this purpose divided into nine main districts, as follows:

District A.—Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New Jersey, New York, Pennsylvania, Delaware, Ohio, Virginia, West Virginia, Maryland, and Kentucky.

District B.—North and South Carolina, Georgia, Florida, Tennessee, Alabama, Mississippi, and Louisiana.

District C.—Minnesota, Wisconsin, and northern Michigan.

District D.—Southern Michigan, Indiana, Illinois, Iowa, Nebraska, and northern and eastern Missouri.

District E.—Kansas, southwestern Missouri, Arkansas, Oklahoma, and Texas.

District F.—North and South Dakota, Montana, Idaho, and Wyoming.

District G.—Colorado, Arizona, and New Mexico.

District H.—Washington, Oregon, and Alaska.

District I.—California, Nevada, and Utah.

The headquarters for each district and the engineer in charge are as follows:

District.	Headquarters.	Engineer in charge.
A	Pittsburgh, Pa.	D. J. Parker, mine-safety engineer.
B	Birmingham, Ala.	E. B. Sutton, mining engineer.
C	Pittsburgh, Pa.	D. J. Parker, mine-safety engineer.
D	Urbana, Ill.	H. I. Smith, mining engineer.
E	McAlester, Okla.	J. J. Rutledge, mining engineer.
F	Butte, Mont.	D. Harrington, mining engineer.
G	do.	Do.
H	Seattle, Wash.	G. W. Evans, mining engineer.
I	San Francisco, Cal.	H. M. Wolflin, mining engineer.

For carrying on this work throughout the country the Bureau of Mines also has 3 rescue trucks (automobiles), 8 safety cars, and 5 safety stations. The headquarters are shown below:

	District.
Pittsburgh, Pa., building, truck 2, car 6	A
Huntington, W. Va., car 8	A
Jellico, Tenn., building	B
Birmingham, Ala., building, truck 1	B
Ironwood, Mich., car 7	C
Urbana, Ill., building	D
Evansville, Ind., car 3	D
Pittsburg, Kans., car 4	E
McAlester, Okla., building	E
Butte, Mont., car 5	F
Raton, N. Mex., car 2	G
Seattle, Wash, truck 3	H
Reno, Nev., car 1	I

The personnel of the cars and stations is shown in the accompanying table.

Each car and station is in charge of a foreman miner acting under the supervision of the district engineer. When a disaster happens it is customary to notify not only the Pittsburgh, Pa., headquarters, but also the district engineer.

Assignment of personnel of mine rescue cars and stations.

Car or station.	Headquarters.	District engineers.	Foreman miners.	First-aid miners.	Clerks.	Cooks.
Station 2, truck 2	Pittsburgh, Pa.	D. J. Parker, B. O. Pickard, J. W. Koster, Dr. W. A. Lynott.	W. J. German	J. H. Zorn	J. F. Fleischut, L. B. Grening.	
Station 3	Jellico, Tenn	E. B. Sutton	J. M. Webb			
Station 4, truck 1	Birmingham, Ala	do	W. T. Burgess			
Station 5	Urbana, Ill	H. I. Smith	J. R. Fleming			
Station 6	McAlester, Okla	J. J. Rutledge	W. W. Fleming			
Station 7, truck 3	Seattle, Wash	G. W. Evans	J. J. Corey			
Car 1	Reno, Nev	H. M. Wolflin, E. Steidle.	J. V. Berry	W. F. Pyne	D. W. Cooke	J. H. Ward.
Car 2	Raton, N. Mex	D. Harrington, C. A. Herbert.	K. H. Chisholm	J. S. Cunningham	A. F. Goldbloom	I. Arthur.
Car 3	Evansville, Ind	D. J. Parker	G. T. Powell	R. Lilly		E. Bonds.
Car 4	Pittsburg, Kans	J. J. Rutledge	J. F. Davies	J. B. Hynal		
Car 5	Butte, Mont	D. Harrington, C. A. Allen.	J. J. Forbes	S. C. Dickinson	S. S. Blum	R. Jones.
Car 6	Pittsburgh, Pa	D. J. Parker	Jesse Henson	V. D. Splane		H. B. Griffin.
Car 7	Ironwood, Mich	do	A. A. Krogdahl	E. A. Sporley		C. Cunningham.
Car 8	Huntington, W. Va	do	G. W. Grove	Edw. McGinnes		W. Dietrick.

CONFERENCE OF FIELD MEN.

Field men of the mining division held a conference in Pittsburgh, Pa., August 15 to 25, 1916, at which nearly all the mining engineers, foreman miners, first-aid miners, and other persons connected with the mine-safety work of the bureau were present and took part in the discussions. Such experiences during the previous year as might be beneficial and suggestive to others were related. The standard first-aid methods and materials adopted by the bureau were demonstrated; standard methods of mine-rescue training; new features in connection with rescue apparatus, electric and flame safety lamps, and explosion-proof mine motors were discussed. The Burrell gas detector and the Gibbs oxygen breathing apparatus were explained, and the purpose and results of recent tests at the experimental mine and their bearing on the work of the engineers in the field were outlined. A mine explosion under working conditions was arranged at the experimental mine and the field men were asked to determine its origin and course, note its effects, etc. After the conference a field meet was held to demonstrate new methods in first aid.

EXPLOSIBILITY OF COAL DUST.

TESTS AT THE EXPERIMENTAL MINE.

The investigation of the explosibility of coal dust under mine conditions has comprised the study of the effect of moisture, size of coal-dust particles, situation and area of mine openings, and the composition of the coal. Explosion tests were made on (1) mixtures of coal dust containing as high as 30 per cent water; (2) coarse coal dust, some of which contained as little as 10 per cent that would pass a 200-mesh screen; (3) pure coal dust, near rooms and also near the mouth of the mine; (4) five coals, including two from British Columbia, to determine the relative explosibility of their dusts. A total of 105 tests were made during the year.

The results of these tests have been compiled with the results of the two previous years, and explosibility curves have been plotted for the use of engineers of the Bureau of Mines in their study of the explosion hazard in coal mines throughout the country. A report setting forth the information gained from the past three years' work is being prepared for publication as a bulletin.

The work has been under the general direction of G. S. Rice, chief mining engineer. W. L. Egy, assistant physicist, was in direct charge, and since April 9, 1917, has reported through J. W. Paul, chief coal-mining engineer. Mr. Egy was assisted at different periods of the year by W. F. Pyne, junior mining engineer; F. S.

Crawford, junior mining engineer; and W. B. Plank, assistant mining engineer; and also by H. C. Howarth, foreman miner; H. P. Greenwald, junior physicist; and John Stellger, laboratory aid.

L. M. Jones, mining engineer, who had been in immediate charge of the experimental mine since the work there started in 1911, died on October 20, 1916, while conducting rescue work after an explosion in the Jamison No. 7 mine, at Barrackville, W. Va.

LABORATORY TESTS.

During the year the bureau continued its efforts to develop a laboratory apparatus by means of which the explosibility of coal dust, as determined in the experimental mine, could be accurately shown when only a few pounds of dust was available. The apparatus is still in the development stage. This work, which was formerly under the direction of J. K. Clement, physicist, was transferred to the mining division, July 1, 1916, and is in charge of W. L. Egy, assistant physicist, who had the aid of E. C. White, junior physical chemist, and Alan Leighton, assistant chemist, for several months.

USE OF ROCK DUST TO LIMIT MINE EXPLOSIONS.

Rock dusting within mines as a means of limiting or preventing the spread of explosions has been continued during the year at three mines in the Pittsburgh district. Engineers of the bureau have studied the efficiency with which the dusting has been maintained by visits and inspections made at intervals and have collected samples of road and rib dust for analysis and study.

The work has been on a scale large enough to determine the costs per 100 feet of entry for the original application of the dust, also for maintaining the proportion of rock dust necessary to render the coal dust nonexplosive. The rock dust has been applied by hand, a more expensive method than by the use of mechanical devices. Such devices, similar in principle to a cement gun, are under development, and during the coming year the bureau intends to obtain data on the efficiency and cost of application by the mechanical methods.

Finely ground limestone costing $2.90 per ton has been applied by hand at the rate of 5.6 pounds per linear foot of entry at a total cost of material and labor of $1.76 per 100 linear feet, and a reapplication by hand of 1.93 pounds per linear foot has been made at a total cost of $0.62 per 100 linear feet. The use of an efficient mechanical device and of rock or shale dust procured at the mine would lower these costs decidedly.

COAL-MINING INVESTIGATIONS IN ILLINOIS.

SUBSIDENCE OVER MINE WORKINGS.

In cooperation with the Illinois Geological Survey and the department of mining engineering of the University of Illinois, the Bureau of Mines continued investigations relating to coal. The chief problems were surface subsidence due to mining; mine fires, including spontaneous combustion; and changes in the condition of mine air.

During the year a good start was made on the study of subsidence. Both longwall and room-and-pillar mines were selected, and concrete monuments were placed along surveyed lines over selected parts of the mines; leveling surveys to detect subsidence being run at regular intervals. Both surface and underground surveys were carefully made. This study must necessarily extend over a period of years in order to permit determination of the amount and rate of subsidence.

The causes of mine fires, the methods of combating them, and the costs and the possible means of reducing the hazard were studied. The study of mine air with respect to the condition of normal mine air and accumulations of gas (methane) was continued. Tests were made under the direction of H. I. Smith, assistant mining engineer, to determine the rate at which methane accumulates at the working faces in three mines, some tests being made when the fan was running and some when the fan had stopped. A report giving the results of the investigations of the past three years of this study of mine air is in course of publication.

The results of an investigation of the use of permissible explosives in Illinois coal mines, which was completed by J. R. Fleming, assistant mining engineer, during the preceding year, was published as a bulletin of the Bureau of Mines. As the advantages of the use of these explosives have been demonstrated, the report should pave the way for a more general use of short-flame explosives in Illinois coal mines. Unfortunately the war conditions, which have caused a great increase in the cost of permissible explosives, have retarded their more general adoption.

The work of the bureau under the Illinois cooperation during the year was carried on by H. I. Smith and J. R. Fleming, and F. K. Ovitz, chemist. Mr. Ovitz's work on the utilization of Illinois coals for coking and the gas-making qualities of such coals is discussed under fuel investigations.

INSPECTION OF MINES ON INDIAN LANDS.

Under the authority of the Secretary of the Interior, the Bureau of Mines supervises the mining methods in mines on the segregated

Indian lands of Oklahoma and on other Indian lands under Government direction, and makes recommendations looking to the increase of safety among the miners and the prevention of waste of coal or other minerals.

To diminish the risk of the occurrence of explosions in dusty or gaseous coal mines, the Secretary of the Interior ordered that on January 1, 1915, permissible explosives be substituted for black powder and dynamite then used in such mines, or that in blasting coal all shots be fired from the surface after the men are out of the mine.

During the past fiscal year, 11 mines were inspected with reference to explosion hazard and the use of permissible explosives. Only 5 or 6 mines remain to be inspected, and these will be examined as soon as possible.

Increased safety in the mines where the Secretary's order is totally or partly enforced is demonstrating daily the wisdom of that order. At one or two mines there has been some friction regarding its enforcement, but this friction is believed to be merely temporary. Conditions have greatly improved even in mines where permissible explosives are used only in part—that is, in entries and other narrow places where the most dangerous shots are likely to be.

In addition to the work connected with the permissible-explosives order, the representatives of the Bureau of Mines examined the segregated coal lands in Oklahoma with reference to requests for reservation of the surface and for additional acreage. These examinations were made in conjunction with the coal-land trustees of the Choctaw and Chickasaw Nations.

Allotted Indian lands on which coal is found are usually examined by the bureau's representative in conjunction with the chief oil and gas inspector of the Five Civilized Tribes.

The surface of the segregated coal lands was sold under the restriction that oil and gas wells thereon should have their location approved by the Bureau of Mines and the State mine inspector of Oklahoma before drilling should begin. There are no oil and gas wells on the segregated coal lands, but there are such wells on allotted Indian lands in the Henryetta coal field, though none is known near a working mine. Careful attention is being given these wells in order to prevent the possible escape of gas into mine workings.

The district engineer, who represented the Bureau of Mines in the work described above, also acted as its representative on the supervisory committee appointed by the Federal courts to work out the Government's interest in ground under streams that has been leased, the so-called river-bed leases, the title to this ground being in dispute.

FIELD INVESTIGATIONS OF COAL MINES WITH REFERENCE TO THE EXPLOSION HAZARD.

During the fiscal year conditions at various coal mines were investigated with reference to the possibility of mine explosions. These investigations were based on past studies, made by the bureau, of conditions after mine explosions and in part on numerous tests at the experimental mine of the explosibility of coal dust under various conditions. By a study of actual mine conditions it was hoped to make the conditions of testing the explosibility of coal dust at the experimental mine more comparable to actual conditions in working coal mines.

These investigations included a general examination of the working areas of a mine; a brief study of mining methods with particular reference to safety measures employed, the collection of samples of return air, and occasionally of suspected or discovered gaseous accumulations over falls or at working faces, in order to ascertain the amount of gas (methane) escaping into the mine; the collection of a systematic series of samples of road and rib dust from working face to pit or drift mouth; and the collection of samples of coal at the face by the standard method used by the bureau. The dust samples were studied with reference to their incombustible (moisture and ash) content and their fineness and chemical composition. From mine observations and the study of the samples a report is made on the general conditions found and the possible changes or safety measures worthy of adoption. Occasionally these investigations were supplemented by the testing of large samples of coal from the mines examined, at the experimental mine.

This work was initiated by G. S. Rice, chief mining engineer, and plans for it were made by Mr. Rice and the late L. M. Jones, engineer. The work has been done in a large number of mines by the bureau's engineers under the direction of J. W. Paul and J. J. Rutledge, mining engineers. Various mines in the southern district and in West Virginia were examined by E. B. Sutton, assistant mining engineer in charge of the southern district, as have mines in the central interior district by H. I. Smith and J. R. Fleming, assistant engineers, and in the Pittsburgh district by J. J. Rutledge, mining engineer, and by E. H. Denny and W. B. Plank, assistant engineers. Further extension of this work is planned in the hope of making it of greater value to the coal-mining industry.

VENTILATION OF METAL MINES AT BUTTE, MONT.

Incidental to the investigation of the prevalence, causes, and prevention of miners' consumption at Butte, Mont., now being conducted by Dr. A. J. Lanza, of the Public Health Service, and Daniel

Harrington, engineer, of the Bureau of Mines, in which a thorough examination was made of the Mountain View, Anaconda, Pittsmont, and North Butte mines, at Butte, Mont., and a less extended investigation of several other mines, much information was collected on ventilation problems, including heat, humidity, and air movement, as well as on the efficiency and safety of various ventilation devices. Mining methods were studied, not only as to their effect on dust production and ventilation, but also as to their safety and their relation to fire hazard.

PULMONARY DISEASE AMONG MINERS.

The investigation of the prevalence of silicosis (miners' consumption) among the miners in the Butte district was continued during the fiscal year by Mr. Harrington and Dr. Lanza.

It became evident soon after the investigation started that not only the actual production of dust underground had to be considered, but also the temperature and humidity and the action of ventilating currents.

Intensive examinations of several mines were made, every stope, raise, drift, and crosscut where men were working being visited. At each working place dust samples were taken and the temperature recorded, both wet and dry bulb; the ventilation and air currents were noted, also any other factor that might affect the hygiene of the working place; data were collected relative to the extent and temperature of ventilating currents in shafts, drifts, and stopes and on levels. The effect of special ventilating devices, such as booster fans, air pipes (canvas and metallic), and humidifying apparatus were studied. The various methods of mining and mine operations causing dust were investigated, as well as the relationship between dust production and ventilating currents.

During the year nearly 1,000 men were examined physically with a view to determining whether miners' consumption was prevalent. As the work is still going on no results can be given as yet, but it is evident that this disease is prevalent in the Butte district, though perhaps in a milder form than in the Joplin district.

FIRES IN BUTTE MINES.

Fires of years' standing in Butte mines have been carefully studied, as well as numerous disastrous recent fires, notably those at the Leonard, West Colusa, and Tramway mines in February, 1917, at the High Ore-Modac mine in April, 1917, and at the North Butte mine in June, 1917. The fire hazard at Butte gains importance daily because the increasing depth of workings and the uniformly higher temperature of the rocks require larger volumes of air at

faster velocities to make the ventilation adequate, and in consequence the heavy timbering in the workings is kept dry and readily inflammable. Modern mining practice requires wise use of electric current, and this is peculiarly true of Butte, because of the cheapness of electricity; consequently electric pumps, fans, and locomotives are freely used, requiring a multiplicity of electrical appliances and devices in shafts and shaft stations, and in drifts, crosscuts, and stopes. As the mine workings are supported almost wholly by timber, much of it very dry, the problem of proper insulation of electric devices is intricate, and is made more difficult by the ground movements resulting from the extraction of large quantities of ore from steeply pitching veins. Many other considerations enter into the fire hazard in Butte mines, making it important and worthy of much study, not only in order to prevent fires and attendant loss of life and property, but also to subdue fires that, burning continuously for many years, have prevented the mining of large quantities of valuable ore, have greatly complicated ventilation and other problems, and have menaced the safety and health of miners. Mine fires in the Butte district have been responsible for the loss of at least 163 lives during the past fiscal year, and at least an equal number of men have been overcome, or nearly so, by fire fumes. The property loss through fires in Butte mines during the fiscal year ended June 30, 1917, would probably total several million dollars.

COOPERATIVE WORK IN CALIFORNIA.

Under the cooperative agreement between the Bureau of Mines and the California Industrial Accident Commission, one of the bureau engineers acts as chief mine inspector of the Industrial Accident Commission. In addition, he carries on investigative work for the bureau, and acts as the district engineer. The Industrial Accident Commission employs three deputy mine inspectors and furnishes office quarters, stenographic assistance, etc.

From July 1, to October 31 the work was under the supervision of Edwin Higgins, who resigned to act as consulting safety engineer for a number of mines. H. M. Wolflin, mine safety engineer, succeeded Mr. Higgins.

The work in California comprised:

Inspection of 342 mines, mills, gold dredges, quarries, and construction tunnels, employing in all approximately 10,500 men. Each mine inspection included the examination of both underground workings and surface machinery, including stamp mills and reduction works. Nearly all safety suggestions and requirements made by the inspector were followed by the operators, whose attention was called to violations of the State mine-safety rules. Practically all the

gold dredges and quarries in the State were carefully inspected at least once.

Investigations and reports were made of 38 accidents in 38 mines, construction tunnels, mills, quarries, and on dredges. The number of men killed in these accidents varied from 1 to 7. The engineer investigating the accident made recommendations to prevent similar accidents.

Twenty-one complaints made in regard to mine-safety conditions were investigated. Many of these complaints were from discharged employees and proved groundless; but some were justified.

Requests made for exemptions to the State mine-safety rules were investigated, and recommendations as to what action should be taken were made to the industrial accident commission.

In carrying on the safety campaign among mine operators and miners four safety bulletins were issued.

In addition to the training work done in California the last two months of the year by car 1 of the Bureau of Mines, the employees of the industrial accident commission trained 115 miners in first aid.

A tentative schedule for merit-rating California metal mines for compensation insurance was prepared; also tentative mine safety standards. This trial rating is to be applied to practically all of the mines in the State before being made effective in order to be sure that it is applicable. The mine safety department of the industrial accident commission has undertaken to apply this trial merit rating.

Tentative safety rules for gold dredges were prepared by a committee representing employers and employees, the industrial accident commission, and independent interests. The work of making these rules effective was perhaps 80 per cent completed before the end of the fiscal year.

Tentative safety rules for quarries were perhaps 75 per cent completed by a committee representing employers, employees, the industrial accident commission, and independent interests.

Arrangements were made for the issuance of technical papers on mining methods in California, but no field work in connection with the preparation of these papers was done during the year.

PHYSICAL TESTS OF EXPLOSIVES.

The physical characteristics of the various classes and grades of explosives used in mining and also the physical characteristics of different kinds of blasting supplies are determined at the Pittsburgh station. The bureau is studying the character and quantity of poisonous and inflammable gases produced by the explosives used in close or inadequately ventilated places, the purpose being to classify explosives on this basis so that the user may have informa-

tion on one of the dangers attending the use of explosives in mines. Also the bureau makes exhaustive tests of coal-mining explosives to determine their permissibility for use in dusty or gaseous coal mines.

During the year 12 explosives were tested to determine their permissibility; of these 10 passed the tests and were placed on the permissible list and 2 failed to pass. Six explosives were placed on the list of permissible explosives because they were identical with explosives already permissible, and 11 explosives were dropped from the list. On June 30, 1917, there were 151 explosives on the list, an increase of 5 for the fiscal year.

Since the promulgation on July 1, 1915, of the "tolerances" applying to the results of analyses and tests of permissible explosives, 123 manufacturer's samples of permissible explosives have been received; 42 of these did not exceed the tolerance. The manufacturers' attention was directed to the particular items wherein the specified tolerance was exceeded in order that they might apply a remedy. If such a remedy is not applied the Bureau of Mines will impose the penalty of declaring nonpermissible the particular lot of explosives from which the sample may be selected.

Two samples of permissible explosives, as they are supplied to the miners, were collected in the field by members of the bureau and subjected to such tests as would determine whether they were similar in all respects to the sample that had been placed on the permissible list. Neither of these samples was found to come within the "tolerance" and the lot represented by each sample was declared nonpermissible.

In determining the character and strength of different explosives, 2,287 examinations and tests were made during the year.

The total sum on deposit at the beginning of the fiscal year and the sum collected during the year for tests of explosives, was $2,333; the sums from the classes of tests were as follows:

For permissibility tests of explosives that passed the tests	$1,500
For tests of explosives failing to pass permissibility tests	150
For special experimental tests	218
Returned to applicants	300
On deposit at end of fiscal year 1917	165
	2,333

INFORMAL TESTS OF BLASTING POWDER.

Informal tests to demonstrate the dangerous features of black blasting powder in a gaseous or dusty mine were made for the mechanical and electrical engineering students of Purdue University on October 17, 1916.

SPECIAL TESTS AND INVESTIGATIONS.

During the year special tests and investigations for the purposes named below were begun or completed.

1. Determining the adaptability of liquid oxygen explosives to blasting in mines.

2. Designing and testing various materials used in the construction of the belts used by shot firers for distributing detonators or caps to miners at their working places.

3. Determining the solid products of combustion remaining in bore holes after blown-out shots of various coal-mining explosives at the experimental mine of the bureau, at Bruceton, Pa.

4. Determining the strength of electric detonators used in blasting on the Panama Canal.

5. Determining the current value of electric squibs, electric igniters, and delay-action electric igniters.

6. Determining whether an increase in the weight of the paper wrapper in which high explosives are sold increases the quantity of poisonous gases evolved on detonation.

7. Determining whether a testing galvanometer can safely be used in testing the continuity of the circuit of electric detonators.

8. Demonstrating that dynamite when detonated expends its force equally in all directions.

9. Determining the strength (with Trauzl lead blocks) and the sensitiveness (with the pendulum friction apparatus) of two samples of 40 per cent strength propylene-glycol-dinitrate explosive.

INVESTIGATIONS OF EXPLOSIONS.

The following explosions were investigated with reference to the character of the explosive and the cause of the explosion:

1. Black Tom Island, Jersey City, N. J., explosives, July 30, 1916.

2. E. I. Du Pont de Nemours & Co., Haskell, N. J., explosives, January 12, 1917.

3. Eddystone Ammunition Corporation, Eddystone, Pa., explosives, April 10, 1917.

4. Barrachville, W. Va., mine explosion, October 19, 1916.

5. Hendersonville, Pa., mine explosion, March 13, 1917.

6. Isabella, Pa., mine explosion, March 18, 1917.

PERSONNEL OF LABORATORY.

The work of making the physical tests of explosives was in charge of S. P. Howell, explosives engineer, aided by A. J. Strane, assistant explosives engineer; J. E. Tiffany, junior explosives engineer; and Charles Schuler, shot firer, throughout the year, and by J. L. Sherrick, R. B. Munroe, C. G. Fallon, E. L. Tarof, and G. E. Postma, junior explosives engineers; and R. P. Bett and A. W. Jarvis, shot firers, during various parts of the year.

CHEMICAL TESTS OF EXPLOSIVES.

The Bureau of Mines laboratory for making chemical tests of explosives is at the Pittsburgh station. The work of this laboratory may be classified as follows:

1. Chemical examination of samples of explosives submitted to the bureau for tests to determine the permissibility of the explosives for use in dusty or gaseous coal mines or the suitability of the explosives for use in metal mines, tunnels, and quarries. Under this head is included the examination of samples of permissible explosives collected in the field from time to time in order to determine whether the permissible explosives on the market maintain the composition of the samples originally tested by the bureau.

2. Analysis and inspection of explosives for other departments of the Government.

3. Miscellaneous investigations and testing of explosive substances and related materials.

4. Examination of samples of road dust, rib dust, and shot-hole drillings, procured after mine disasters, in order to determine, when possible, whether a shot had been fired or an explosive burned or detonated, as the possible cause of the specific explosion.

5. Special investigations of methods for the analysis and testing of explosives, and investigations of the preparation, properties, and uses of explosives.

A summary of the analyses, determinations, and tests made during the year follows:

Summary of analyses, determinations, and tests of explosives.

Analyses of permissible explosives	16
Analyses of manufacturers' samples of permissible explosives	53
Analyses of field samples of permissible explosives	4
Analyses of dynamites	16
Analyses of detonators and mercury fulminate	24
Analyses of black powder and smokeless powders	4
Determinations of products of combustion of explosives	34
Determinations of nitrogen in explosives	249
Stability tests of explosives	116
Sand tests of strength of explosives	119
Waterproof tests of electric detonators	43
Miscellaneous analyses	7
Miscellaneous determinations and tests	131
Organic preparations	11

ANALYSES AND TESTS FOR OTHER GOVERNMENT ESTABLISHMENTS.

The inspections of detonators and dynamite for the Panama Canal occupied 39 days (estimated as the work of one man). Consultation work with the War Department required the cooperation of one chemist two days.

MISCELLANEOUS INVESTIGATIONS.

Special investigations and tests of explosive substances and related materials, for which special reports have been submitted, were as follows:

(*a*) Two samples of toluol for the Swiss Government.

(*b*) Three samples of nitrobenzol and one sample of dinitrobenzol for the Swiss Government.

(*c*) Two samples of mercury fulminate for the Frankford Arsenal, Ordnance Department, United States Army, to ascertain their relative purity, strength, and sensitiveness.

(*d*) Analysis of samples of coal from the Creighton mine at Creighton, Allegheny County, Pa., for products of combustion.

(*e*) Two complete analyses of acetone and one of barium nitrate for the Swiss Government.

(*f*) Investigation of propylene glycol, its nitration and the properties of propylene glycol dinitrates as compared with those of nitroglycerin, for the Commercial Research Co., of Long Island City, N. Y.

On several occasions coal samples from the bore holes of blown-out shots have been submitted to the laboratory for analysis in order to determine whether black powder or a permissible explosive was fired. Such information was desirable as an aid in investigating the causes of coal-mine explosions.

In order that the laboratory might be able to render effective assistance an investigation was undertaken with samples of coal residues from blown-out shots obtained under known conditions. In connection with this investigation approximately 50 samples were examined. The work thus far done indicates that it is a comparatively simple matter to determine: (1) Whether black powder, a high explosive, or no explosive at all was fired in a bore hole; (2) whether a high explosive detonated completely or simply burned; and (3) if a high explosive simply burned, the character of the explosive. A preliminary laboratory report on the procedure to be followed has been submitted and the conclusions therein advanced have been subsequently tested with entirely satisfactory results. Further work will be done soon on other test samples before final report is made. The investigators were J. Barab and G. F. Hutchison.

SPECIAL INVESTIGATIONS OF ANALYTICAL METHODS AND OF EXPLOSIVES.

The special investigations of the year included the following:

An investigation of "nitron" as a gravimetric reagent for the analysis of substances used in explosives. This was completed and the results were published in a chemical journal. The investigators

were W. C. Cope, explosives chemist, and J. Barab, junior explosives engineer.

At the suggestion of C. E. Munroe, consulting explosives chemist, an investigation of the preparation and explosive properties of nitrosubstitution compounds of hydrocarbons was resumed, the nitroxylenes being investigated with the purpose of studying their explosive properties and the best methods for preparing them. The literature of the subject was examined and a comprehensive bibliography on the xylenes and nitroxylenes was prepared. Methods of separation of the isomeric xylenes in commercial xylene has been investigated and nitration experiments on commercial xylene and on crude metaxylene have been in progress. E. J. Hoffman, assistant chemist, had charge of this investigation.

In connection with the investigation of the nitration of xylene, the preparation of paraxylene by the Fittig synthesis and of the intermediate products used in the synthesis were investigated. This work, which was required because of inability to purchase the pure hydrocarbon, was done by E. C. White, junior physical chemist.

In anticipation of the receipt of explosives containing nitrated sugar as an ingredient, it became necessary to work out a method for the determination of that substance. Several samples of sucrose nitrate were prepared, its properties studied, and data accumulated for use in its estimation. E. J. Hoffman and V. P. Hawse, junior chemist, made this investigation.

Supplementary to the work on propylene glycol, its nitration and the properties of propylene glycol dinitrate, previously referred to, the dinitrate and explosive mixtures containing the dinitrate were tested with particular reference to their stability. The great importance of propylene glycol dinitrate as a possible substitute for nitroglycerin makes this investigation of much importance.

Other problems that have received some attention are the separation of nitroglycerin from nitrocompounds and the Berl-Jurrissen method for determining nitrogen in explosives.

Two papers dealing with the application of the nitrometer for the determination of constitution and estimation of nitrogen in a class of nitrocompounds (nitroamines) and with nitron as a gravimetric reagent for the analysis of substances used in explosives were published in a chemical journal; a technical paper on the nitration of toluene and one on the determination of nitrogen in substances used in explosives were published by the bureau during the year. Another technical paper on priming substances for high explosives was submitted for publication.

The explosives chemical laboratory was in charge of W. C. Cope, explosives chemist, from July 1, 1916, to March 16, 1917; E. J. Hoffman, assistant chemist, was acting chief for the rest of the year.

Messrs. Cope and Hoffman were assisted by G. F. Hutchison, junior explosives chemist, throughout the year, and by J. E. Crawshaw, assistant explosives chemist; E. C. White, junior physical chemist; J. Barab, C. Matthews, Perry A. Dame, Foster B. Doane, junior explosives chemists, and V. P. Hawse, junior chemist, for different periods of time during the year.

MINE-ACCIDENT STATISTICS.

MINING FATALITIES.

In order to provide a body of reliable information for use in determining the hazards of workmen in the mineral industries and the work to be done in lessening the death rate from accidents the Bureau of Mines has, since its establishment, been compiling and publishing reports on mine fatalities.

The metal-mine accident returns tabulated by the bureau have been furnished voluntarily by operators, there being no Federal law requiring the operators to report. Although these figures are not absolutely complete they are on a comparable basis for calendar years, and furnish opportunity for an intelligent comparison of statistics of accidents in the different States. The mining companies, who are to be congratulated on their willingness to cooperate with the bureau, in general have not hesitated to furnish the bureau with the data it desired.

Reliable data on nonfatal injuries at coal mines are in demand, but information relating to these injuries is lacking and for the most part is incomplete. More details concerning these nonfatal injuries should be obtained, and it is hoped that this will be accomplished with the development of cooperative agreements with State mine inspectors and State compensation bureaus. The cooperative agreements whereby the coal-mine inspectors furnish the bureau monthly reports of coal-mine fatalities is very satisfactory.

GLOSSARY OF MINING AND METALLURGICAL TERMS.

A glossary of terms used in the mining industry is in course of preparation. About 25,000 terms used in the various branches of mining, quarrying, and metallurgy have been arranged alphabetically and are being verified. The list includes many chemical terms related to metallurgy, and about 2,000 Spanish-American mining terms.

ACCIDENTS AT MINES, QUARRIES, METALLURGICAL PLANTS, AND COKE OVENS.

In addition to publishing monthly reports on coal-mine fatalities throughout the country, the bureau issued reports on accidents in metal mines and in quarries for the calendar year 1915. Reports on

accidents at metallurgical plants, metal mines, quarries, and coke ovens durings 1916 are being prepared, as well as a report on the production and distribution of explosives during 1916. The compilation of accident statistics is under the direction of A. H. Fay, mining engineer.

EXAMINATION AND CODIFICATION OF MINING LAWS.

In continuation of its efforts to compile information that will enable it to indicate the laws that have proved most effective in promoting safety and efficiency in the mineral industries, the Bureau of Mines is preparing a complete codification of all the mining laws of the several States, with annotations and references to all decisions of the courts of higher resort that have construed these laws and defined their application. This work, which will soon be ready for publication, will supplement the codification of United States laws relating to mining that the bureau published in 1915.

Besides bringing this work nearly to completion, J. W. Thompson, law examiner, has continued to compile abstracts of the decisions of the United States and State courts in cases relating to mining. These abstracts of decisions are being published regularly and every effort is made to include every decided case relating to mining. During the year three volumes of these abstracts were published as Bulletins 126, 143, and 147.

EXAMINATION OF MINING RULES AND REGULATIONS.

Any new rules or regulations that the Bureau of Mines proposes or recommends for adoption as tending to increase safety and efficiency in mining are carefully scrutinized in the bureau before being published. In addition, various legal matters relating to contracts and licenses require expert examination. Some matters that have received especial notice during the past year were the issue of licenses for the production of gasoline by the Rittman process, the working of the petroleum conservation laws adopted by the State of Oklahoma, the status of the petroleum industry in Wyoming, and the drafting of a proposed new law to govern the mining of metalliferous minerals, through a committee of consulting engineers composed of W. R. Ingalls, John Hays Hammond, J. Parke Channing, J. R. Finlay, and L. B. Ricketts.

The work described was in charge of Max Ball, mining engineer.

MINE INSPECTION IN ALASKA.

Sumner S. Smith, mining engineer, continued to serve as Federal mine inspector for the Territory of Alaska, with headquarters at Juneau, Alaska. Mr. Smith made many field trips in the course of

his duties. He cooperated with the Territorial mine inspector, a procedure made necessary by the mines of Alaska being scattered over a great area, approximately one-fifth of that of the United States, and made an official inspection of the mines in southeastern and southwestern Alaska. Mr. Smith rendered two reports during the year, a formal one to the Secretary of the Interior describing work of mine inspection during the fiscal year 1917, and a longer one that discussed at length the progress of mining in Alaska during the calendar year 1916. This report is now being published by the Bureau of Mines as Bulletin 153.

Mr. Smith says that continued high prices for copper and other metals made the year an unusually prosperous one in the mining industry. Work on the Government railroad and the opening of the Matanuska and Bering River coal fields for mining under permits and licenses granted by the Secretary of the Interior stimulated the production of coal, several small mines being opened.

During the year the Territorial legislature passed a new mine-inspection law which provides for the registration of all mines and the reporting of serious and minor accidents.

DIVISION OF FUELS AND MECHANICAL EQUIPMENT.

The division of fuels and mechanical equipment has charge of investigations relating to the increase of safety and efficiency in the use of fuels and in mechanical equipment at mines. During the year the division gave considerable time to work relating to the new buildings in Pittsburgh. The plans for the interior equipment were completed. Owing to the slow progress made by the contractor, it will be fall before the main group of buildings is fully occupied and winter before full service can be had from the power plant.

The division has been able to render large service to other Government bureaus during the past year in matters pertaining to fuel economy. Investigations of the processes of combustion have led to the issuance of publications that are believed to be of greater usefulness and fundamental importance than those heretofore issued.

A start has been made in an investigation of the processes of making coal gas, the object being the conservation of fuel and the improvement of the coke produced.

The inspection and testing of coal purchased for the use of the Government has been continued, as in years past, and is being adapted to the present unusual conditions in the fuel market.

Excellent service has been rendered in perfecting devices and methods to promote the safety of men who must work in abnormal atmospheres. The field of investigation has included not only mines but also submarines and gas-filled trenches.

Many investigations of electricity in mining that had been in progress several years were completed during the year, but little work has been done in the investigation of mechanical equipment in mines because of the available force being largely engaged on work connected with the new buildings.

The work of this division is under the supervision of O. P. Hood, chief mechanical engineer, in charge of the Pittsburgh station.

INSPECTION OF GOVERNMENT FUEL PURCHASES.

Approximately $7,800,000 is the cost in one year of the Government's purchases of fuel which are represented by the samples analyzed by the Bureau of Mines. The work of collecting and analyzing these samples has been about the same as in previous years.

During the year special consideration was given to the selection and use of local coals that can be used with advantage by Government institutions throughout the United States and to the savings that can be realized by utilizing land-grant freight-rate tariffs in rail shipments of coal for Government use. By the substitution of the cheaper available coals and the utilization of the reduced tariffs, without regard to the economies obtainable by better methods of burning the coal and the installation of more efficient coal-burning equipment, a conservative estimate points to a possible saving of more than $150,000 a year. In hearings before the Committee on Mines and Mining, of the House of Representatives, on a bill to provide for the uniform selection and purchase of fuel used by the United States Government, it was developed that on Government coal purchases of more than $8,000,000 it was reasonable to assume that, through better selection, more efficient use, improved methods of handling and storing, and the shipment of fuel under reduced Government tariffs, a saving would be effected of more than $300,000 annually.

The fuel-inspection headquarters and laboratories in Washington, D. C., were moved on April 18, 1917, to quarters in the new Interior Department building, where new laboratories were provided and improved equipment installed for preparing and analyzing samples.

Fuel-inspection engineers inspected and sampled coal shipments for the Panama Canal and the Panama Railroad Co. During the year 5,487 samples of coal were received and analyzed; of this number 410 samples were analyzed for the State governments of New York, Maryland, Maine, Indiana, and Minnesota. The work of the laboratory was interrupted for a period of about two months because of delay in the equipment of the laboratories in the new building of the Interior Department in Washington, consequent on inability to obtain construction material. During this interruption of work it was necessary to waive the analysis requirements under many con-

tracts for coal for Government use, payment for the coal being made at the flat contract price per ton. Consequently the number of samples analyzed was less than normal.

The work described was in charge of G. S. Pope, engineer, assisted by P. M. Riefkin, N. H. Snyder, and D. M. Obler (resigned), engineers. The chemical laboratory was in charge of J. D. Davis, chemist, during July, 1916, and after that of his assistant, H. M. Cooper, assistant chemist, who was assisted by E. L. Wallace, Gustave Bornscheuer, A. Christie (resigned), W. A. Gonzalez, C. R. Locke (transferred), F. W. Hyde (resigned), P. M. Nash, N. Neville (resigned), and C. D. Hamilton, junior chemists; R. A. Sherman (transferred) and H. J. Nichols (transferred), analysts.

FUEL EFFICIENCY INVESTIGATIONS.

During the year the fuel efficiency laboratory, which is at the Pittsburgh station of the bureau, was engaged mainly in two groups of investigations, namely, the study of the combustion of coal, and the study of the transmission of the heat from the hot products of combustion of the fuel into the boiler water.

COMBUSTION OF FUEL.

The general purpose of the investigation of the process of combustion is to obtain quantitative data for the use of engineers in designing grates and furnaces for burning efficiently various kinds of fuel. The investigations have been carried on in two special apparatus, one of which was designed for studying the combustion of the fuel in the fuel bed, and the other for studying the combustion of the gases and smoke in the space of the furnace beyond the fuel bed. During the first part of the year the study of combustion in the fuel beds of hand-fired furnaces was completed and prepared for publication as a technical paper.

During a large part of the year the fuel-efficiency section studied the burning of gases and smoke in the combustion space of a hand-fired furnace. The furnace used in these investigations has a long combustion chamber and is so equipped that a measured quantity of air can be supplied at a uniform rate through the grate, and another quantity separately measured, over the fuel bed to burn the gases and the smoke rising from the fuel bed. The work done shows that the quantity of the air supplied through the grate determines the rate, and the quantity of air supplied over the fuel bed determines the completeness of the combustion. By measuring the air, the desired quantity, determined in advance, can be introduced in each place, and thus the rate and the completeness of combustion can be more easily controlled.

The object of these particular investigations is to determine how large a combustion space a furnace must have to burn efficiently a given coal at a given rate of combustion. Hence several coals of different chemical characteristics are burned at various rates and with different air supplies over the fuel bed. The completeness of combustion that would be obtained with furnaces having different sizes of combustion space is determined by taking many simultaneous gas samples at several cross sections of the long combustion chamber.

So far three kinds of fuels have been tested, namely, Pittsburgh, Illinois, and Pocahontas coal, each being tested with three rates of combustion and different air supply over the fuel bed. It is planned to test also anthracite coal, lignite, and wood.

This investigation with the hand-fired furnace is a continuation of experiments made previously with the same furnace equipped with a Murphy stoker, as described in Bulletin 135[a]. They also supplement the results of the study of combustion in the fuel bed of hand-fired furnaces, which was published in Technical Paper 137[b].

The results obtained confirm beyond dispute the conclusions stated in Technical Paper 137, to the effect that only about one-half of the air needed for the complete combustion of coal in a furnace can be supplied through the fuel bed; the other half must be supplied over the fire, or complete combustion is not possible. On account of the intermittent feeding of coal in hand-fired furnaces it is very difficult to maintain a condition in the furnace favorable to burning the coal efficiently. Immediately after firing, through the distillation of volatile matter from the freshly fired coal, the air supply over the fuel bed is comparatively low, so that there are losses from incomplete combustion. Two minutes after firing, when the volatile matter is driven off, there is too large an excess of air over the fuel bed.

After the present series of tests has been completed it is planned to replace the fire-brick arch over the grate with a cold surface furnished by a water pan and to study whether the slow heating of the freshly fired coal will induce furnace conditions more favorable to the efficient burning of coal than those obtainable with a fire-brick arch over the grate.

HEAT-TRANSMISSION INVESTIGATIONS.

The object of the heat transmission investigations conducted at the Pittsburgh station is to obtain reliable data for the rational design of steam boilers as heat absorbers. Among the factors to be investigated the principal are: The diameter and the length of the boiler

[a] Kreisinger, Henry, Augustine, C. E., and Ovitz, F. K., Combustion of coal and design of furnaces: Bull. 135, Bureau of Mines. In press.

[b] Kreisinger, Henry, Ovitz, F. K., and Augustine, C. E., Combustion in the fuel bed of hand-fired furnaces: Tech. Paper 137, Bureau of Mines, 1916, 76 pp.

tubes, the temperature of the gases, and the velocity at which the gases pass over the heating surfaces of the boiler. It is also planned to investigate the effect of coatings of scale and of soot on the efficiency of the boiler. The apparatus used for these investigations consists of a fire-tube boiler fitted successively with several sets of tubes of different diameters. The shell of the boiler is so constructed that the length of the boiler can be made 20, 15, 10, and 5 feet. The source of heat will be the hot gases from a furnace burning natural gas. The experiments began with the boiler 20 feet long and the tubes 3 inches in diameter. During the previous two years a series of 55 tests was made with the initial temperature 600°, 800°, 1,000°, 1,200°, 1,400° C., the velocity of the gases ranging from 25 to 500 feet per second, and the steam pressure in the boiler being 110 pounds gage. During the year 1917 another series of 25 tests was made, except that the steam pressure was kept at 10 pounds gage, in order to determine the effect of steam pressure on the rate of heat transmission. The results of both of these series of tests were partly prepared for publication as a technical paper.

As a secondary problem the causes of leaky joints between the boiler tubes and the tube sheets were studied. Measurement of the temperature of the various parts of the joint while the boiler was in use showed that every time the temperature of the joints exceeded 750° F. a leak occurred, in spite of the fact that after a test was completed the joints were allowed to cool very slowly in an effort to avoid leakage. So far the indications are that the leakage is due to overheating the joints and not to cooling suddenly, although the latter theory has been held regarding leaky joints in locomotive boilers.

Three reports were completed and submitted for publication during the year, as follows: A bulletin on measuring temperature of gases in boiler settings; a technical paper on combustion at low rate in fuel beds of hand-fired furnaces; and a technical paper on the chemistry of burning the volatile matter of coal.

The fuel-efficiency laboratory was in charge of Henry Kreisinger, engineer, assisted by C. E. Augustine, assistant engineer, and J. F. Barkley, junior electrical engineer. The fuel-gas laboratory which makes the chemical analyses in connection with this work was conducted by S. H. Katz, assistant physical chemist; F. H. Mollenhoff, junior physical chemist; and E. T. Gregg, junior chemist.

BOILER AND FURNACE EFFICIENCY IN HEATING AND POWER PLANTS OF THE GOVERNMENT.

The increasing cost of the fuels used in Government heating and power plants has emphasized the need of seeing that such fuels are

properly selected and efficiently used. As a result the bureau received more requests for advice as to fuels for such plants than ever before.

Among the services rendered by the bureau have been the following: Making an inspection of the fuel-burning equipment and a study of the conditions under which fuel is used at more than 30 Indian agencies and schools throughout the country; giving advice on the selection of fuel or of boilers or stokers at 6 other Indian schools, at the Government Printing Office, in Washington, D. C., and at a pumping station at one of the posts of the War Department; testing and inspecting new power-plant equipment installed at two Government plants; and making an experimental study of the causes of operating troubles in another plant.

In addition many tests have been conducted at the Pittsburgh experiment station of the bureau for the War Department to determine the comparative values of different fuels for use in residence-heating boilers, and for the Indian Office, to ascertain the possibility of substituting cheaper fuels for anthracite as used in heating stoves. Tests have also been made for the Navy Department of an apparatus for indicating the carbon dioxide content of chimney gases.

The efficiency work mentioned above was conducted by S. B. Flagg, engineer; R. L. Beers, assistant fuel engineer; D. J. Jenkins, junior fuel engineer; and Clarence Condon, W. A. Gee, and W. O. Owens.

ILLINOIS COALS.

COKING OF ILLINOIS COALS.

In cooperation with the Illinois Geological Survey and the department of mining engineering of the University of Illinois, the Bureau of Mines has been conducting, chiefly through its station at Urbana, Ill., investigations relating to the increase of efficiency in the utilization of coal. One of these investigations was undertaken to ascertain the extent to which Illinois coals had been used for making coke and the possibility of extending their use. Many trials and experiments which had been made with Illinois coals were investigated and the results compiled for publication as a bulletin of the Bureau of Mines. This bulletin was in press at the end of the year. F. K. Ovitz, assistant chemist, represented the bureau in this work and wrote the bulletin.

MANUFACTURE OF ILLUMINATING GAS.

In March, 1916, the Illinois Gas Association asked the Bureau of Mines to undertake a study of the manufacture of illuminating gas. In compliance with this request the bureau began work to determine

whether investigations already made by the bureau are applicable to the problems involved and which of the problems can best be studied by the bureau. In order to ascertain the suitability of Illinois coals for making gas, tests were made, in inclined retorts, of various mixtures of Illinois and eastern gas coals in an endeavor to find out the effect of mixing on the quality of the coke.

This work was conducted by F. K. Ovitz, assisted by F. P. Strauch, holder of the Illinois Gas Association fellowship, in cooperation with the University of Illinois and the Illinois State Geological Survey.

UTILIZATION OF LIGNITE.

In cooperation with the University of North Dakota, the Bureau of Mines continued an investigation of methods whereby the fuel contained in the great lignite fields of some States might be utilized more efficiently.

The tests made during the year were confined to laboratory methods and results. The first work involved a study of the range of low-temperature distillation of lignite with reference to the quantity and quality of the distillates, and especially the production of light oils.

The second problem involved a study of the determination of the size of the coal tested and its effect upon the yield of distillates and the time and temperature of distillation.

The third problem involved a determination of the effect of the moisture content of the original lignite on the character and quantity of the distillate and the time and temperature of distillation.

The fourth problem involved a careful study of the best methods of drying lignite, with especial reference to preparing lignite for distillation and briquetting. This problem involved the study of varying temperatures, the varying conditions of atmospheric movement through the drier, rate of drying, movement of the material, thickness of the material, and appliances for drying. The work on this problem was partly done in the laboratory, and a beginning has been made in connection with the work at the experimental station of the University of North Dakota, at Hebron.

ELECTRICAL EQUIPMENT OF MINES.

The electrical section of the Bureau of Mines, which is engaged in the study of problems relating to the use of electricity in mining and other industries, has its laboratories and headquarters at the Pittsburgh station.

During the past year many matters have approached completion that have been pending for some time. Some of these are mentioned below:

1. Practical completion of an approved list of portable electric mine lamps, begun four years ago.
2. Practical completion of an approved list of flame safety lamps, begun two years ago.
3. Practical completion of the development of a methane detector, begun eight years ago.
4. Completion of electrical rules for mines, begun three and one-half years ago.
5. Completion of the development of a suitable mine-lamp cord, begun one year ago.
6. Completion of the design of a rescue lamp, begun three years ago.
7. Practical completion of the development of a permissible flash lamp, begun three years ago.

During the year the bureau turned into the United States Treasury as fees from electrical tests made by the electrical section the sum of $946.20.

In the order of their importance the activities of the section for the past year were as follows:

Investigation of portable electric mine lamps, investigation of explosion-proof motors, compilation of electrical rules for mines, investigation of permissible storage-battery locomotives, development of an electrical methane detector, development of a satisfactory mine-lamp cord, development of a rescue lamp, development of a permissible flash lamp, preparations for the test and approval of gas detectors, investigation of hydrogen consumers for submarines, investigations in connection with the eyepieces of gas masks, preparations for moving to the new building in Pittsburgh.

PORTABLE ELECTRIC MINE LAMPS.

The purpose of this investigation was the establishment of a list of permissible portable electric mine lamps.

The investigations of two lamps (the General Electric and the Pioneer) were completed and the lamps were approved. The approval (No. 11) issued to the Manlite lamp was rescinded for cause. The rest of the work has been the consideration of changes in and extensions of approvals already issued, the investigation of bulbs and cords for lamps already approved, the reestablishment of the approval of the 26-V bulbs rescinded June, 1916, and the complete revision of the schedule governing the testing of portable electric mine lamps.

As a result of the bureau's investigation, begun about four years ago, the portable electric mine lamps now in use in the mines of this country number more than 100,000.

FLAME SAFETY LAMPS.

In the course of the work, begun February, 1916, for the establishment of a list of permissible flame safety lamps, various pieces of testing equipment were constructed, the Ackroyd & Best lamp was tested and approved, the schedule governing the testing of flame lamps was revised, and the apparatus used in the tests was improved.

EXPLOSION-PROOF MOTORS.

In the course of the investigation, first undertaken eight years ago, for the establishment of a list of permissible explosion-proof motors for use in mines, a new testing gallery was standardized, progress made in the testing and development of two motors for a coal-cutting equipment, and one motor for general use. No new approvals were issued during the year.

STORAGE-BATTERY LOCOMOTIVES.

An investigation, begun the spring of 1916, has as its object the establishment of a list of permissible storage-battery locomotives.

During the year the development of specifications for the necessary tests was almost completed, and it is believed that they will be accepted by the manufacturers of locomotives. Many preliminary tests were made to determine the dangers inherent in the use of storage-battery locomotives in gaseous places.

METHANE DETECTOR.

The purpose of an investigation, originally begun in 1909, is the development of an accurate, sensitive, and convenient gas detector for service in mines, or in other places where inflammable gas may collect.

Nearly six months' work was done during the year. Most of the known obstacles to success have been overcome and final designs for the detector are now well under way.

ELECTRICAL RULES FOR MINES.

Work has continued on the preparation of rules that could be used as a basis of standard rules for installing and using electricity in bituminous coal mines. During the year a complete text of the rules was published as a technical paper. These rules were reviewed by the mines committee, the code committee, and the standards committee of the American Institute of Electrical Engineers, who passed a resolution authorizing the bureau to print on the title-page of the technical paper the following sentence: "Prepared in cooperation with the mines committee of the American Institute of Electrical

Engineers, and recommended by the American Institute of Electrical Engineers for trial."

A modification of these rules has been submitted to the New York Industrial Commission, with the suggestion that it be adopted.

CORD FOR ELECTRIC MINE LAMPS.

The purpose of this investigation, begun in the fall of 1915, was to develop a durable lamp cord for electric mine lamps for use on the miner's cap. Most of the tests were made during the previous year. This year the complete report has been compiled and distributed.

LAMPS FOR RESCUE WORK.

The purpose of this investigation, begun three years ago, was the development of an official lamp for inspection and rescue service. During the year a satisfactory lamp was completed. The Koehler Manufacturing Co. has undertaken the construction of these lamps, and the bureau will approve them if they pass the tests laid down in a schedule already prepared.

PERMISSIBLE FLASH LAMP.

An investigation, begun in 1916, has as its object the establishment of a list of permissible flash lamps for use in mines.

During the year a schedule was prepared and a lamp made by the American Ever Ready Co. was tested. It is believed that the work in progress will be completed early in the coming year.

GAS DETECTORS.

During the year the electrical section began work on the establishment of a list of permissible gas detectors for use in places where inflammable gas may collect. During the year a schedule for carrying on tests was prepared and the first examinations of the Mine Safety Appliance Co.'s model of the Burrell gas detector were made.

PERSONNEL OF SECTION.

The personnel of the electrical section has consisted of H. H. Clark, electrical engineer, in charge, and L. C. Ilsley and R. W. Crocker, assistant electrical engineers; E. J. Gleim, O. I. Gaines, and O. C. Heffner, junior electrical engineers, who have served throughout the year; and S. P. Stone, junior electrical engineer, who served approximately six months. C. M. Means acted in the capacity of consulting engineer. The electrical engineer, in making his report for the year, praises the enthusiasm, ability, and industry of his assistants.

INVESTIGATIONS OF BREATHING APPARATUS.

During the year the bureau continued its investigations dealing with the improvement of breathing apparatus for rescue work in mines after fires or explosions and made further improvements in the Gibbs apparatus, which has been described in bureau publications. The work of the past year included the completion of a new form of mouthpiece for breathing apparatus, containing a saliva pump, a relief valve, and safety devices.

A new absorbing cartridge for breathing apparatus was devised and put in practicable form. The cartridge contains granular caustic soda supported on wire-gauze trays of peculiar form. Used with the Gibbs apparatus, which has a variable but automatic oxygen feed, it enables the user to work for three-hour periods instead of for only two hours, which has heretofore been the standard.

Improvements in details of the Gibbs apparatus have been constantly made and tested in an effort to make it as perfect as possible.

Designs for a half-hour breathing apparatus were worked out. In these a reducing valve of small size has the finimeter incorporated in the valve so that the two form a single unit. By this construction the size and weight of the complete unit is reduced to the lowest limits.

USE OF SODA LIME.

The CO_2 absorbing power of soda lime made after the Haldane formula was tested with a view to using soda lime in breathing apparatus. It is not quite as active as NaOH, but gives promise of usefulness.

Tests for the removal of CO_2 from the air within inclosed places by the use of soda lime proved successful.

In connection with the Jeffries-Norton process for separating air into oxygen and nitrogen, various methods for rapidly determining oxygen and nitrogen were tried. After thorough tests the interferometer method was adopted.

A new form of stop valve for high-pressure gases was developed and adopted for the oxygen tanks of breathing apparatus. This valve, by entirely preventing leakage, should save considerable oxygen in the course of each year and also should protect wearers of breathing apparatus against a very insidious source of danger.

During a period of cold weather in January, 1917, tests were made to determine the lowest temperature at which the Gibbs apparatus will aspirate. It was found that the CO_2 absorption was good and the parts of the apparatus functioned properly down to $+15°$ F. Below that temperature moisture from the breath froze in the respi-

ration valves. At +5° F. the freezing of moisture extended to the breathing bag and the oxygen inlet valve so as to put the whole mechanism out of commission at the end of 10 minutes.

DIVISION OF MINERAL TECHNOLOGY.

In the field of miscellaneous mineral technology the Bureau of Mines is conducting investigations of some of the more important problems relating to the production and utilization of the following substances:

Minor metals—aluminum, bismuth, chromium, nickel, cobalt, manganese, etc.; rare metals—molybdenum, tungsten, radium, uranium, and vanadium; precious metals—iridium, osmium, platinum, and palladium; metalloids—arsenic, antimony, columbium, etc.; nonmetals—bromine, chlorine, silicon, etc.; nonferrous alloys; building materials—cement, granite, lime, marble, sand, etc.; abrasives—alundum, burrstones, carborundum, etc.; silicates and clays, clay products, feldspar, and quartz; potash, phosphates, nitrogen; miscellaneous minerals—asbestos, asphalt, borax, fluorspar, fuller's earth, gems, graphite, pyrite, etc.; minerals used in pigments and mineral paints—barite, ochre, white lead, zinc oxide, etc.

The funds appropriated for work in mineral technology are still insufficient to permit the bureau to cover the whole field. During the fiscal year attention has been centered on investigations begun in the previous year and on those problems that bear most directly on the needs of the nation in the present emergency. These problems relate chiefly to the development of larger domestic supplies of those minerals or metals necessary to the industries of the country that in consequence of the war can not be imported and are now or are liable to be in short supply.

The work of the division continued in charge of C. L. Parsons, chief chemist, with headquarters in Washington.

INVESTIGATIONS OF RADIUM.

For several years, as described in previous annual reports of the Bureau of Mines, the bureau has been conducting investigations looking to the upbuilding of a radium industry in the United States and the acquirement of a supply of radium for use in the treatment of cancer at hospitals.

During the year the cooperative work with the National Radium Institute has been completed. Altogether about $8\frac{1}{2}$ grams of radium element in the form of radium bromide have been obtained from this cooperation, the Bureau of Mines getting more than a gram as its share. The radium belonging to the Bureau of Mines is being used for scientific and medical research.

One of the problems involved in the treatment of carnotite ore, the chief source of radium, which developed at the end of the past fiscal year, was the efficient handling of the carnotite concentrates for the extraction of the radium. These concentrates were more difficult to treat by the method evolved by the Bureau of Mines than carnotite ore itself, but after considerable experiment the difficulties were overcome and concentrates can now be treated, although not so easily or cheaply as the ore. A method for the treatment of radium-barium sulphates high in silica has also been developed so that the silica can be efficiently and cheaply removed.

The solubility of pure radium sulphate in water in different concentrations of sulphuric acid and in sodium sulphate solution has been determined. This work has a definite commercial application, giving important information on the best conditions for precipitating the radium from solution. It is being extended in two directions, to determine the temperature coefficient of solubility, and the concentration of the sulphuric acid, if there be any, at which the solubility shows a rapid increase. During the year a fully equipped, semicommercial technologic laboratory has been installed at the Golden experiment station. Experiments with commercial quantities of rare metals and ores can be made in this laboratory.

Considerable work has been done on pitchblende as regards concentrating low-grade ore and treating both the ore and the concentrates for the recovery of radium and uranium. Over 100 tons of low-grade ore was concentrated and the concentrates obtained, with about 6 tons of medium-grade ore, were treated on an experimental basis in the plant of the National Radium Institute at Denver, by methods developed by the Bureau of Mines. The radium recovered has been devoted by Mr. Alfred I. DuPont to the treatment of cancer.

INVESTIGATIONS OF OTHER RADIOACTIVE METALS.

The extraction and recovery of ionium and actinium from carnotite ore has received considerable attention during the year. Work is still in progress with the object of obtaining efficient concentration methods for these elements so that they can become a valuable by-product in the extraction of radium from carnotite ore.

Work has been planned for some extensive experimental work on the extraction and recovery of mesothorium from monazite sands, as a by-product in the manufacture of incandescent mantles.

INVESTIGATORS EMPLOYED.

The work on radium and allied metals continued in charge of R. B. Moore, physical chemist, with headquarters at Golden, Colo. He had the aid of S. C. Lind, chemist in radioactivity; J. C. Mor-

gan, junior chemist; and A. C. Rhoads, H. M. Eastman, J. P. Bonardi, and Clarence Scholl, junior chemists in radioactivity.

TREATMENT OF ORES OF MOLYBDENUM AND VANADIUM.

Work has been started, under a cooperative arrangement with the Colorado School of Mines, on the concentration of molybdenite, wulfenite, and vanadinite; also on the separation of vanadinite from wulfenite. The metallurgical treatment of these minerals is also being studied. This work, which is still in progress, is in charge of R. B. Moore, physical chemist, assisted by J. C. Morgan, junior chemist.

TECHNOLOGY OF MOLYBDENUM ORES.

The results of an investigation of the mining and treatment of molybdenum ores and the uses of molybdenum, made in previous years by F. W. Horton, mineral technologist, was published as a bulletin during the year.

NONFERROUS ALLOYS.

The Bureau of Mines, in cooperation with Cornell University, has for some years been conducting at Ithaca, N. Y., various investigations relating to the increase of efficiency in the production and utilization of various alloys used in the industries.

The main work done in the fiscal year 1916–17 was on the production of ferro-uranium. Using high-grade UO_2 made by a method devised by C. L. Parsons, chief chemist of the Bureau of Mines, the laboratory at Ithaca was able to make, on an experimental scale, a ferro-uranium high in uranium and low in impurities with a good recovery of the uranium in the UO_2. A stock of ferro-uranium was thus accumulated which will be used in making up a series of uranium steels for test by the War Department as to their suitability for ordnance. A technical paper describing the production of this ferro-uranium was sent to press.

Continuing the work of the past several years on electric brass melting as a means of saving zinc and other metals, the investigators made inspection trips to see several types of electric brass furnaces, and, in cooperation with the Detroit Edison Co., are now engaged in testing a furnace of a type not heretofore tried. As the construction of the furnace is not yet fully complete, definite data on its performance will not be obtainable until early in the coming fiscal year.

The work of devising a pyrometer that can be satisfactorily used in commercial brass melting has been continued and, with the cooperation of the Hoskins Manufacturing Co., an instrument has been

made that is working well in electric-furnace tests and promises to be of commercial value.

These alloy investigations were in charge of H. W. Gillett, alloy chemist, who had the assistance of E. L. Mack, assistant alloy chemist.

PRODUCTION OF MANGANESE.

Manganese is needed in the manufacture of steel. Because of there being few large bodies of high-grade manganese ore in the United States, the great bulk of the ore and of the manganese-iron alloys used by steel works in this country has been imported. To meet the situation that confronted steel plants when imports were restricted by the war in Europe, the Bureau of Mines, in cooperation with the United States Geological Survey, began investigating the manganese resources of the United States for the purpose of ascertaining how known ores can be more fully utilized by improved methods of mining or treatment. The work for the Bureau of Mines is being done by W. C. Phalen, mineral technologist.

TECHNOLOGY OF SALT MAKING.

A review of salt making in this country has been prepared in cooperation with the United States Geological Survey. This report, to be published as a bulletin, discusses the occurrence of rock salt and brines in the different States; the methods used in mining rock salt and preparing it for market; the manufacture of salt from sea water and from brines pumped from wells; and the manufacture of bromine and calcium chloride from brines.

The information presented in this bulletin was collected by W. C. Phalen, mineral technologist.

MANUFACTURE OF GYPSUM PRODUCTS.

In cooperation with the United States Geological Survey, the Bureau of Mines is about to publish a technical paper describing the methods used in mining and calcining gypsum, and the manufacture and uses of the various gypsum products. This paper was prepared by R. W. Stone, of the Geological Survey.

STONE-QUARRY INVESTIGATIONS.

A study of the marble and sandstone quarry industries of the country having been completed in previous years the past fiscal year has been devoted chiefly to an investigation of the quarrying of limestone and related rocks for the manufacture of Portland cement. The purpose of this investigation is to point out the most efficient method of conducting every phase of this type of quarrying, the best

equipment to be employed, and the most effective means of avoiding accidents. This investigation involved visits to many quarries in order to study actual working conditions. Special attention was given to the attainment of greater efficiency and safety in blasting, to the economical handling of rock, and to the relation of quarrying to the mixing of the raw materials used in Portland cement. The work is still in progress.

A bulletin on sandstone quarrying in the United States was issued during the year.

These investigations have been in charge of Oliver Bowles, quarry technologist.

INVESTIGATION OF CLAYS AND THE CERAMIC INDUSTRIES.

Investigations dealing with the utilization of the clays found in the United States, which were started several years ago, continued during the past year. The problems that received most attention were methods of refining secondary kaolins of Georgia so that these clays might be made available for the use of potters who in the past have depended on imported kaolin; a study of the ways in which colloid particles of clay after dispersion in water (by which they are freed from the impurities associated with them in clay beds) may be made to flocculate so that they can be readily collected; and a comprehensive investigation, in cooperation with the State geological survey, of the properties of the fire clays found in Maryland. The work on clays was done by H. G. Schurecht, junior ceramic chemist, under the general supervision of A. S. Watts, consulting quarry technologist.

INVESTIGATIONS OF NICKEL.

On account of the United States being at present dependent on foreign sources of supply for the nickel so urgently needed in the manufacture of special steels for armor plate, ordnance, and industrial purposes the Bureau of Mines has undertaken a special investigation of certain nickel ores known to exist in this country, with the purpose of determining the best methods of extracting nickel from these ores on a commercial scale. This investigation is in charge of C. E. Julihn, mineral technologist.

PETROLEUM DIVISION.

The work of the petroleum division may be classified under three heads: Petroleum technology; engineering technology; and chemical technology. The work in petroleum technology deals with all problems connected with the production of petroleum. The section of engineering technology carries on studies of all engineering prob-

lems of the petroleum industry, such as the storage and transportation of oil, the construction of oil camps, the manufacture of gasoline from natural gas, and the mechanical development of any processes connected with the production, storage, transportation, or refining of petroleum or its products. All problems of a chemical nature are included in the branch of chemical technology, which is in charge of E. W. Dean at Pittsburgh, Pa. The important investigations now under way include refinery processes, the determination of the chemical and physical properties of petroleum and its products, the investigation of the chemical and economic possibilities of oil shale, and the development and examination of various processes for increasing gasoline production.

An earnest endeavor has been made to adapt the work of the petroleum division to present needs. All methods that promise to increase the supplies of oil available, or will reduce wastes, increase the percentage of gasoline obtainable from the same amount of oil, or increase efficiency in utilization, have been considered and the work has been directed to these ends. Fortunately many of the investigations under way before this country was at war were of this nature and are directly applicable to the immediate need of increasing the production of oil and gasoline and conserving the supplies now at hand. In addition, much information has been furnished the war committees or is being collected for them. Educational work aimed at conserving the supplies among consumers and at increasing the production and eliminating wastes by producers is being carried on or is planned for the future.

During the first half of the fiscal year, until his resignation, the petroleum division was in charge of W. A. Williams, chief petroleum technologist. During the last half of the year, after the resignation of Mr. Williams, the division was in charge of Chester Naramore, chief petroleum technologist.

PETROLEUM TECHNOLOGY.

COOPERATIVE INVESTIGATIONS.

During the past year the section of petroleum technology has carried on considerable cooperative work with the Indian Office and the General Land Office. For the Indian Office the petroleum division has had charge of the work of several oil and gas inspectors whose duties are to inspect oil and gas operations and to prevent wastes of oil and gas on Indian lands in Oklahoma that are under the supervision of the Secretary of the Interior.

Field examinations have been made and technical and practical advice has been given in reports to the General Land Office and the Department of Justice, in connection with the operation of various

properties in the California oil fields under Government supervision. During the last half of the fiscal year the members of the petroleum division have acted in an advisory capacity to various Government departments in regard to problems arising in the progress of the war. This work has included the making of reports on the future supply and demands in this country for petroleum and its products, and the tendering of advice on various technical questions connected with the suitability and availability of liquid fuels for special purposes. Other cooperative work, such as the testing of gasoline and fuel oil, has been carried on with different governmental departments.

During the year the practical oil-well drillers in the employ of the Bureau of Mines began cooperative work with various States in connection with the improvement of drilling methods for conserving oil and gas. Considerable work was done in Oklahoma, and cooperative work on an extensive scale is now being started in Illinois, Wyoming, and Colorado. The bureau plans to extend this work to Texas, Louisiana, and to such other fields as may be desirable.

USE OF MUD-LADEN FLUID.

Gratifying results have been obtained from the campaign made for conserving gas and oil in the drilling of wells. This work—first started in Oklahoma in 1913 for the purpose of reducing the enormous wastes of gas then taking place on Indian lands—has been continued with increasing success until at present the use of mud-laden fluid for conserving gas and for protecting oil and gas sands is in common and successful use and is no longer a matter of comment in the oil fields. As the operators become more familiar with it, and recognize its advantages, the practice is extending to other fields and to other purposes than those for which it was primarily advocated. Since the scarcity of casing has become acute on account of the demand for steel for other purposes, some of the more progressive companies are using mud fluid to reduce the amount of casing for a well and yet provide adequate protection to the oil and gas measures. Mud fluid is also being used to protect casing from damage by corrosive waters.

A report entitled, "Methods for increasing the recovery from oil sands," by J. O. Lewis, petroleum engineer, will soon be available for distribution as Bulletin 148. This bulletin embodies the information collected by trips to various oil fields and by researches in the laboratory. The use of vacuum pumps, the displacing of oil with water, and the use of compressed air or gas in the Smith-Dunn or Marietta process, were investigated, and the principles involved in these problems were studied. In the many experiments performed, especial attention was given to obtaining information on the propor-

tion of the oil ordinarily recovered in oil fields, and how much more oil is theoretically or practically possible of recovery.

The results showed that the proportion of oil recovered from the oil sands by the methods in common use was much less than had been assumed, and that a vast reserve of oil still remains underground in fields commonly regarded as practically exhausted. From the studies made and the records of properties that have used improved methods, the bureau believes that a considerable part of this oil formerly unavailable can be recovered and added to the supplies to meet the threatened future shortage of petroleum production in the United States. It is believed that the beginning made in solving the problems of increasing the recovery of oil can be followed with great benefit to the petroleum industry and to the industries dependent on it.

Incidental to the study of this problem, much information was disclosed bearing on the interference of wells, the decline of oil-well productions, the estimation of the contents of oil sands, and the future yields of oil wells, as well as on other problems connected with the recovery of oil. Lines of research were opened that can be profitably followed in the future.

GEOLOGIC STRUCTURE IN OIL FIELDS.

The results of an investigation by C. H. Beal, petroleum technologist, of the geologic structure in the Cushing oil and gas field, Oklahoma, and its relation to oil, gas, and water, will soon be issued as Bulletin 658 of the United States Geological Survey under cooperative agreement with the Bureau of Mines. This paper deals with the relation of oil and gas and water to the geologic structure of the rocks in the Cushing field, and several economically important conclusions are brought out, which not only show the value of such work, but also very likely will prove of use to oil operators in the exploitation of other fields.

OIL-FIELD ACCOUNTING.

A bulletin entitled "Cost accounting for oil producers," has been prepared by C. G. Smith, petroleum accountant, and will soon be published. This bulletin represents several years' experience and work in oil-field accounting and should prove of great value to oil men because of the singular difficulties in keeping proper accounts of drilling operations.

CEMENT METHOD OF EXCLUDING WATER.

F. B. Tough, petroleum technologist, has been investigating the methods of excluding water from oil and gas sands for several months. This investigation has dealt especially with the use of

cement for excluding water from oil wells, and promises to be of importance to oil operators by explaining the methods now in common use in various California fields and recommending their use in other fields such as Oklahoma, where methods of cementing oil wells are little known. The report is the first of a series dealing with investigations aimed at reducing the tremendous losses that are caused by the infiltration of water into oil and gas sands.

DECLINE OF OIL FIELDS.

Another investigation, by C. H. Beal, petroleum technologist, will be of importance to geologists and oil operators because it deals with the decline of oil wells. The results of this investigation are to be published by the Bureau of Mines in a report entitled, "The decline and the ultimate production of oil properties," which will contain composite decline curves of each important oil field and statistics on the ultimate production per acre of different fields. The bulletin will be of especial value to engineers and geologists who have occasion to appraise oil properties and to estimate the oil that may be obtained from prospective oil territory or from producing oil properties. In addition, the report will be of much value to this Government by providing more accurate data and methods for estimating the supplies of oil that will be available in the future.

BIBLIOGRAPHY OF PETROLEUM.

A bulletin entitled "Bibliography of petroleum for 1915," prepared by Miss E. H. Burroughs, editorial assistant, is now in press and should soon be issued. This bibliography is the most comprehensive of its kind ever published and should fill a long-felt need of the industry. The bureau plans to publish similar bibliographies yearly.

ENGINEERING TECHNOLOGY.

In the section of engineering technology, C. P. Bowie, petroleum engineer, has prepared a report entitled, "Methods of storing oil," which will soon be published as Bulletin 155. This bulletin gives the methods followed by the larger oil companies in locating and laying out oil storage farms; presents complete specifications, with drawings, for the construction of a 55,000-barrel all-steel tank and a 750,000-barrel concrete-lined storage reservoir with wooden roof, giving costs and a discussion of various construction methods; and discusses the loss of oil in storage, giving tables of actual losses, under varying conditions, from tanks and reservoirs in commercial use. Universal observance of the best principles of tank construction and operation would save a great quantity of gasoline now lost

by evaporation and thus add to the supplies of gasoline so much needed for the successful conduct of the war and for industrial purposes.

RECOVERY OF GASOLINE FROM NATURAL GAS.

The absorption process of recovering gasoline from natural gas was investigated by G. A. Burrell, chemist, who gave much attention to its development, and the results of his investigation have been published by the Bureau of Mines as Bulletin 120. This process affords an entirely new means of obtaining gasoline, heretofore unavailable, from natural gas.

A detailed study of the equipment used in compression plants for obtaining gasoline from natural gas has been made by W. P. Dykema, assistant engineer, who visited practically every important plant in the United States and examined the methods used. In Bulletin 151, now in press, Mr. Dykema discusses many of these plants and gives conclusions as to the best method of compression. It is believed that this paper presents an excellent example of the method by which the Bureau of Mines can be of the maximum benefit to oil producers, by giving the results of hundreds of discussions and thousands of observations of plant practice, thus furnishing operators of such plants with valuable information.

Mr. Dykema has also investigated the engineering problems of the absorption process of recovering gasoline from natural gas, and is preparing a technical paper on the construction and operation of absorption plants throughout the country. In view of the promise of this process and the great need of gasoline, this paper should prove opportune; it supplements Mr. Burrell's paper (Bulletin 120), which discusses the chemical problems and the principles involved in the absorption process.

In addition to doing other engineering work A. R. Elliott, assistant engineer, has been mapping the productive part of the Osage Nation in Oklahoma. The maps are for the various uses of the Government.

TOPPING PLANT.

A report dealing with methods of topping petroleum in the United States is being prepared under the direction of J. M. Wadsworth, petroleum engineer, and will be in press shortly. The report describes fully the construction and operation of representative types of plants used for removing the lighter fractions from crude oil. Besides describing operations the report gives the results of experimental tests of condensers and heat exchangers and the results of laboratory distillations of various crude oils and their products. The aim of the report is to bring about greater efficiency and a reduction of the waste of gasoline in topping plants.

OIL FIRES.

Fires at oil wells and storage plants are being carefully studied by C. P. Bowie, petroleum engineer, and a technical paper is being prepared which will describe the various methods used throughout the oil fields of this country for preventing and extinguishing such fires. Fires caused a loss of over 2,000,000 barrels in the Oklahoma fields alone during 1915. The paper presents many ideas in advance of general practice.

THE DIESEL ENGINE.

A report by Herbert Haas, consulting engineer, entitled "The Diesel engine, its fuels, and its operation," will be issued within a few months as Bulletin 156. This report deals with topics that are now of especial importance to ship propulsion, and is intended to aid the attainment of greater efficiency in the utilization of fuel oils.

SANITATION AT OIL CAMPS.

Oil-camp sanitation is also under investigation by Mr. Bowie, who is preparing a much-needed report on the improvement of sanitary conditions in oil camps, pumping stations, storage farms, and refineries. This report will show how the health and welfare of employees and of the inhabitants of oil communities may be greatly improved and their efficiency as workers consequently increased through the adoption of economical methods of garbage and sewage disposal and of protection against disease-carrying insects.

GAS TRAPS FOR OIL WELLS.

W. R. Hamilton, petroleum engineer, has prepared a paper on traps for separating the gas from the oil as it comes from the well. This paper presents a thorough study of the principles involved and the operation and construction of present types of traps. By means of traps much gas that has been going to waste can be saved and utilized, and a great quantity of gasoline that hitherto has been escaping into the atmosphere can be saved and made available.

CHEMICAL TECHNOLOGY.

ROUTINE EXAMINATIONS.

The routine work of the chemical section has consisted chiefly in the inspection of fuel-oil purchases of the War Department, some 200 samples having been analyzed, which represent about 775,000 barrels of oil, worth between $750,000 and $1,000,000. About 125 gasoline distillations were made to determine the quality of gasoline purchased by various Government agencies. Many samples of crude

oil were analyzed for field men of the bureau and for the United States Geological Survey and miscellaneous interests. A number of oil-shale distillations with determination of the ammonia content were made for the Bureau of Mines and the Geological Survey. Miscellaneous petroleum products were analyzed and many alleged gasoline improvers were investigated, and their value proved or disproved.

PROPERTIES OF COMMERCIAL GASOLINE.

Results of an investigation begun during the fiscal year were published in a technical paper entitled "Motor gasoline, properties, laboratory methods of testing, and practical specifications," by E. W. Dean, organic chemist. The object of the investigation was to enable the Bureau of Mines to write specifications for the Government purchases of gasoline and naphtha, and incidentally to supply much-needed information to oil men and consumers on the important properties of gasoline and the simplest and most trustworthy way of determining these properties.

UNSATURATED HYDROCARBONS IN GASOLINE.

E. W. Dean and H. H. Hill undertook to determine a satisfactory method of defining the "degree of unsaturation" of the unsaturated hydrocarbons in gasoline and the property that differentiates "cracked" or "synthetic" from other types of motor fuels. The results of this work will shortly be published as a technical paper of the Bureau of Mines.

CRACKING PROCESSES FOR GASOLINE.

E. W. Dean and W. A. Jacobs are now preparing a report on the production of gasoline from the heavier oils by the vapor-phase "cracking" process. An extensive series of laboratory experiments conducted for the purpose of obtaining reliable and accurate information has substantiated earlier claims for the commercial possibilities of this process.

PROPERTIES OF GASOLINE.

E. W. Dean and H. H. Hill also are collaborating in a report on laboratory methods for the distillation of high-boiling and emulsified crude oils and petroleum products. This investigation is expected to provide much needed information on the best methods of analyzing products that are difficult to distill.

Several hundred samples of gasoline and information on their source of production and on market conditions have been obtained from retailers throughout the country. These samples are being

analyzed, and the results are to be published as a technical paper on the "properties and prices of gasolines marketed throughout the United States during the first half of the calendar year 1917." The work of collecting the samples, determining their character, and preparing the report is being done by E. W. Dean, H. H. Hill, and W. A. Jacobs.

REFINERY METHODS.

Although no formal problem has been outlined on the study of refinery methods and equipment a large number of refineries have been inspected and information gathered concerning the latest refinery practice and recent developments in the industry. This information is to be used in the preparation of papers on various phases of the refining industry.

INVESTIGATION OF OIL SHALES.

During the year the Bureau of Mines has been particularly interested in the vast deposits of oil shales in Colorado and Utah that have been disclosed by the field investigations of the Geological Survey. Because of the threatened shortage of petroleum from oil fields in the future these shales are considered to be the principal reserve in this country for the future supply of gasoline and other petroleum products. Consequently, much attention has been given to preliminary investigations of the richness of the shales, and a detailed study is being made of the best methods of obtaining oil from the shales, the character of the shale oils and the proportions of the various oil products and by-products obtainable by different methods of distillation. The investigations made lead to the belief that it is now commercially feasible to work selected deposits of shale in competition with oil from oil wells, and that these oil-shale reserves can be considered of immediate importance to the oil industry. Several commercial plants for mining and treating the shale have been planned and the Bureau of Mines will closely follow the developments. It is believed these investigations have already demonstrated a reserve of oil adequate for all future needs of the Navy. This investigation was in charge of D. T. Day, consulting chemist.

SPECIAL ENGINE FUELS.

Clarence Netzen, assistant chemical engineer, and D. T. Day, consulting chemist, have done cooperative work in connection with the Rittman process, and have also carried on cooperative engine-testing work for determining the effect of various fuels on engines of certain design. The results of this work, though they do not warrant publication, indicate the line of attack the Bureau of Mines will follow

when it can complete the installation of its own engine-testing equipment at Pittsburgh, Pa.

OTHER PUBLICATIONS.

During the year a bulletin by W. F. Rittman and E. W. Dean, entitled "Analytical distillations of petroleum," which had been prepared during the preceding fiscal year, was published by the bureau, as was a technical paper on the physical and chemical properties of gasoline sold throughout the United States during the calendar year 1915, by W. F. Rittman, W. A. Jacobs, and E. W. Dean.

METALLURGICAL DIVISION.

The metallurgical division of the Bureau of Mines is studying various problems relating to the increase of health and safety and the prevention of waste in the treatment of ores. Most of these problems have been under investigation for several years, although the metallurgical division was not officially organized until the appointment of F. G. Cottrell as chief metallurgist in 1916. The work now under way covers the smelting of sulphide ores, the hydrometallurgy of gold and silver ores, the development of the flotation process of ore recovery, the treatment of low-grade and complex ores of copper, lead, and zinc, and investigations relating to the smelting of iron and the manufacture of steel. These investigations are being conducted at different experiment stations, those relating to iron and steel were centered at the Pittsburgh office, and those dealing with nonferrous metals being carried on chiefly at Berkeley, Cal., and Salt Lake City, Utah.

SMELTER-SMOKE INVESTIGATIONS.

During this year the metallurgist in charge of the Salt Lake City station has represented the Anaconda Smelter Commission and has been directly interested in the investigations being conducted at the Anaconda smelter to improve the smoke conditions there.

One electrical precipitation plant costing about $100,000 has been in operation since October, 1916, treating about 800,000 cubic feet a minute of the roaster gases. Full-scale experiments with this plant led the Anaconda company to begin work on an installation to handle all the gases of the roaster, about 3,000,000 cubic feet a minute. The plan adopted calls for 20 electrical precipitation units, a 525-foot stack, and the necessary flues, and involves an expenditure estimated at $1,600,000. The total ependiture for dust and fume recovery at the Anaconda smelter will probably exceed $2,000,000. During the next two years the program for the recovery of dust and fume at

Anaconda will be well developed and the amount of these substances that will escape into the air will be much reduced.

The reduction of the sulphur dioxide in the smelter gases will probably be slower. However, progress is being made. During the fiscal year much study was given to the scheme of utilizing sulphuric acid in the manufacture of phosphate fertilizers for shipment to the eastern markets. The acid plant at Anaconda is now being enlarged to a capacity of 180 tons a day and plans are being made for a plant that can treat about 50 tons of phosphate rock a day for the production of a high-grade acid phosphate. It is expected that in a few months at least 30 tons a day of the sulphuric acid being made at Anaconda will be utilized in the manufacture of this phosphate.

UTILIZATION OF SULPHURIC ACID THROUGH THE MANUFACTURE OF PHOSPHATES FOR FERTILIZERS.

How to bring about the manufacture of phosphate products on a commercial scale is a very important problem, as it involves the utilization of the waste sulphur dioxide in smelter smoke and the development of the phosphate deposits of Utah, Idaho, and Wyoming. The investigations are being made in connection with the work of the Anaconda Smelter Commission.

Experiments have been made at Anaconda toward the manufacture of a glacial phosphoric acid, or a high-grade acid liquor, and preliminary experiments have been made at the by-product coke plant of the Illinois Steel Co. at Joliet, Ill., for utilizing this acid liquor to make ammonium phosphate in place of the ammonium sulphate now being made. In these preliminary experiments the presence of iron and alumina in the Anaconda phosphoric-acid liquor prevented the formation of a product that could be handled in the apparatus at Joliet. Further experiments will follow. Other experiments, aimed at determining the best practical method for making the ammonium phosphate from the impure acid, are being continued on a small laboratory scale at the Salt Lake City station.

COOPERATION WITH SMELTING COMPANIES IN THE IMPROVEMENT OF SMOKE CONDITIONS AROUND SMELTERS.

During the past year the work conducted in cooperation with the smelting companies for the purpose of improving smoke conditions around smelters has been aimed primarily at the recovery and utilization of the material wasted in the smoke. It is found that at most plants the recovery of the solid constituents—dust and fume—is feasible and would pay a reasonable return on the investment required. Usually the recovery of all the waste gases is not feasible. At plants where the waste gases can not be utilized the investigations are for

determining what emission of gases into the atmosphere may constitute a nuisance or be a menace to agricultural and other interests and, where the gases are found to cause damage, to determine the most practical method of preventing injury to crops.

The American Smelting & Refining Co. has continued the elaborate and careful investigation begun by it in Utah in 1914 along lines indicated by the work of the Selby Smelter Commission.[a] These investigations are being extended to the company's plants at Tacoma, East Helena, El Paso, and eastern points. The metallurgist in charge of the Salt Lake City station of the Bureau of Mines has been directly interested in these investigations and has had access to all the data obtained. These data have been made available for helping other companies in similar investigations.

At the request of the officials of the St. Louis Smelting & Refining Co. and the American Zinc, Lead & Smelting Co., the metallurgist in charge of this station has studied the smoke conditions about smelters in Illinois, Kansas, Oklahoma, and other States of the Middle West and has begun investigations for the improvement of those conditions. These investigations are now being carried on by the staffs of the companies, and the results will be available and will enable the bureau to assist other companies in similar problems.

USE OF SULPHURIC ACID ON ALKALI SOILS.

One of the interesting and valuable phases of the smelter-smoke investigations has been that of using sulphur or sulphuric acid for soil improvement. Decidedly beneficial results have been obtained by the direct application of sulphuric acid, in amounts varying from a fraction of a ton to several tons to the acre, to alkali and other refractory soils. Certain soils that would not yield good crops have produced excellent crops after treatment. In all the experimental plots of the American Smelting & Refining Co. last year, the addition of acid or sulphur has increased the yield as compared with the untreated check plots. On some plots the increase was as much as 200 per cent. The results obtained by the American Smelting & Refining Co. check those obtained by Dr. C. B. Lipman in his experiments in California. Evidently, with sulphuric acid available, vast areas of now worthless land can be reclaimed and the productivity of other lands greatly increased.

RECOVERY AND UTILIZATION OF SULPHUR DIOXIDE IN SMELTER GASES.

A large part of the work done during the year at the Berkeley, Cal., station of the bureau related to the recovery and utilization of sul-

[a] Holmes, J. A., Franklin, E. C., and Gould, R. A., Report of the Selby Smelter Commission: Bull. 98, Bureau of Mines, 1915, 528 pp.

phur and sulphur compounds from the smelting of sulphide ores. These investigations were the outcome of the cooperation with the Selby Smelter Commission (as described in the annual report of the Director of the Bureau of Mines for the fiscal year 1914) and the Anaconda Smelter Commission.

In this work there has been an investigation of the possibilities of utilizing substances that might absorb rapidly the sulphur dioxide in smelter gases and on heating liberate the dioxide in a concentrated form suitable for bleaching paper pulp. Also, the Berkeley station investigated the possibility of using the dilute sulphur dioxide of smelter gases in the direct production of phosphate fertilizer (superphosphate) from phosphate rock.

RECOVERY OF ELEMENTAL SULPHUR.

An investigation of the chemical reactions underlying various patented processes for recovering elemental sulphur from pyrite by modifications of roasting methods was completed during the year at the Berkeley, Cal., station of the bureau. These investigations showed that various claims made for these processes were not well grounded and that the processes investigated would not recover a large percentage of sulphur from pyritic ores. The results of this investigation are being prepared for publication.

DETERMINATION OF SULPHUR IN GASES.

In the course of the investigation described above, an analytical method for determining the H_2S and SO_2 content in gas mixtures was developed at the Berkeley station during the year.

SEPARATION OF ARSENIC IN SULPHUR FUMES.

Experiments at the Berkeley station having shown that in the distillation of sulphur from arsenical pyrites the arsenic always accompanied the sulphur, investigations of the properties of mixtures of sulphur and arsenic sulphide led to the conclusion that although fractional distillation might effect a partial separation, a complete separation might be had by extraction of the sulphur with a suitable solvent, such as carbon bisulphide.

USE OF SULPHUR AS CEMENTING MATERIAL.

With a view to finding new uses for sulphur that might be recovered as a by-product in the roasting and smelting of sulphide ores, the Berkeley station investigated the possible use of sulphur as a cementing material. Some long-time tests of "sulphur concrete" remain to be completed, but the results obtained indicate that although sulphur mixed with suitably graded rock dust or sand forms an aggregate

having nearly the tensile strength of Portland cement, this aggregate is not permanent but slowly decomposes. The use of crushed pyrites as the aggregates in "sulphur concrete" gives a more enduring material. From the facts now known it is thought that means may be found to stabilize sulphur concrete, but work in this direction has not been pushed because of the demand for sulphur for other purposes.

LOW-GRADE AND COMPLEX ORES OF LEAD AND ZINC.

At its Salt Lake City station the Bureau of Mines, in cooperation with the department of metallurgical research of the University of Utah, has continued investigations relating to the concentration and metallurgy of low-grade complex ores of lead and zinc, with the purpose of developing means whereby the valuable metals may be profitably extracted from ores that can not be treated profitably under present-day practice. In the mining districts served by the Salt Lake City station there are vast quantities of low-grade and complex lead and zinc ores that are waiting for special methods by which the minerals may be profitably recovered. Of the several problems under investigation, the two most important have been:

1. The recovery from oxidized lead ores of all the valuable metals—gold, silver, and lead—either in concentrated products or as metals.
2. The treatment of low-grade oxidized zinc ores.

During the year the greatest progress on the problem of the treatment of oxidized lead ores has been in the application of a volatilization process. The ore is mixed with salt and heated to about 900° C. All the lead, silver, and gold, with any copper in the ore, are volatilized in the form of chloride fumes. Former experimenters effected volatilization successfully on a fairly large scale, but were not successful on a commercial scale in catching the chloride fumes. In the work of this station, volatilization has been successfully effected in several types of furnaces, 125 to 150 per cent of the theoretical amount of salt being used to form the chlorides, and the fumes have been collected in an electrical precipitator. This work has created considerable interest among mining and metallurgical men of this district, and the station has received many inquiries about the details of operation. In this district salt is one of the cheapest raw chemicals because great quantities can readily be obtained at low cost from Great Salt Lake. For the coming year experiments on a larger scale are being planned, and in these the experimenters hope to have the cooperation of several mining companies.

Some work has been done on the cyclic leaching of lead from an oxidized ore by using a saturated salt solution acidified with sulphuric acid. The lead chloride and lead sulphate dissolved in the

brine are precipitated with lime. Before precipitating the lead, however, it is necessary to free the solution from iron, aluminum, and calcium. For this purpose crushed lime rock is added to the pulp after the actions of the acid and the salt have practically ceased, so that only one filtration of the pulp is necessary before precipitation of the lead compounds.

Although the treatment of oxidized lead-silver-gold ores by flotation methods has received considerable study at the station, the results were not generally successful. A thorough concentration of the valuable minerals could not be obtained in the larger number of the ores investigated.

Pending the outcome of large-scale tests which are being made by the technical staff of the Bunker Hill & Sullivan Mining & Concentrating Co. at its new plant at Kellogg, Idaho, no further laboratory work has been done at this station on the treatment of lead ores by chloridizing roasting, followed by leaching with a concentrated salt solution, a process that was given much study at the Salt Lake City laboratories in 1915 and 1916. The tests made then demonstrated that the process is technically feasible, although it involves rather delicate manipulation.

Even if this process or a flotation process should prove to be commercially applicable, there would remain the problem of treating ores in regions where no water is available or where smelting can not be done successfully. The volatilization process described above is therefore considered the most important development of the year's work, and investigations relating to it will be continued.

As regards the best treatment for oxidized zinc ores, the chief progress of the year has been in hydrometallurgy. The object sought has been to dissolve the zinc in low-grade oxidized ores and precipitate it as oxide. No serious difficulty has arisen in dissolving the zinc, but the subsequent filtration of the pulp has caused trouble. This trouble has been largely overcome by treating the raw ore with strong sulphuric acid, thereby making a mud, and calcining this mud at 600° C. From the calcined product the zinc can be leached successfully with a solution of calcium chloride. The purification of the chloride solution before precipitation of the zinc oxide with lime gave trouble, but there has been progress toward a solution of the problem. Ground lime rock removes iron and aluminum compounds and some of the calcium sulphate. Some chloride of lime is necessary to oxidize the manganese to a form that will not be precipitated as hydrate by the caustic lime. It is expected that a zinc oxide product containing only a small amount of calcium sulphate can be obtained, and that the process will prove applicable for treating small bodies of ore where water is available.

The possibility of the igneous concentration of zinc from certain ores has been demonstrated at this station, but the fuel consumption has proved excessive. Because of the high fuel cost, ores containing less than 20 per cent of zinc probably can not be treated in this way, and for such ores hydrometallurgical methods will be especially suited.

Much work remains to be done on the low-grade zinc ores, and this work is urgent in view of the large tonnage of such ores awaiting successful treatment. The problem of treating low-grade ores that can not stand high freight rates and are in districts where water is scarce is especially important.

In connection with these laboratory investigations, R. R. Hornor, mining engineer of the bureau, made a survey of several of the mining districts of Utah and a part of Nevada, where the ores are low grade and complex. Mr. Hornor's reports have furnished data on the mining conditions, the water supply, and the transportation facilities of these districts, this information having a decided bearing on the kinds of metallurgical treatment that can be used.

INVESTIGATIONS OF THE FLOTATION PROCESS.

Investigations relating to the flotation process were continued during the year. Attempts were made to concentrate some of the oxidized lead and zinc ores by coating the ore particles with a film of sulphide and then using flotation. Some ores have given satisfactory recoveries by this method, but with others the results have not been good.

The work of testing various flotation oils, especially those being made under the direction of the Forest Products Laboratory of the Department of Agriculture, has been continued.

RECOVERY OF POTASH FROM ORES AND METALLURGICAL PRODUCTS.

Besides the work on lead and zinc ores other lines of work have been started at the Salt Lake City station. One is concerned with the problem of recovering potash from nonferrous ores and metallurgical products in the West. Samples of the ores being treated and of the mill and smelter products were obtained from practically all the large concentrating and smelter plants in Utah, Nevada, New Mexico, Arizona, and also from the Cripple Creek district, Colo. The potash content of these products was determined and a potash balance made for each mill. The materials containing the largest potash content have been considered possible raw material for the production of potash. Tailings from mills in Cripple Creek contain about 10 per cent potash. Most mill products are, of course, finely crushed.

Investigations are in progress and will be continued during 1917 to determine the cheapest and most efficient methods for recovering

the potash and the other metals contained in these products. Direct leaching, calcining followed by leaching, and special volatilization methods are all being tested.

QUICKSILVER INVESTIGATIONS.

In March, 1917, as an outcome of the great demand for quicksilver for military purposes the Bureau of Mines, through its Berkeley station, made a cooperative arrangement with the three producers of quicksilver in California under which the bureau was to assist in a critical study of present methods of treating quicksilver ores with a view to determining and reducing fume and other losses. The urgent demand for quicksilver to be used as mercury fulminate in detonators for explosives and the slight improvement in the metallurgy of mercury during the past 20 years combined to make this study of importance, and work is now well under way. Already a method of determining stack losses of quicksilver in smelting and a rapid method for quicksilver determinations in laboratory work have been developed, and data and considerable necessary information on furnace operation have been collected.

INVESTIGATIONS RELATING TO IRON AND STEEL.

Several iron and steel investigations begun in previous years were suspended or temporarily given little attention in the fiscal year 1917. Important as these investigations were, the unprecedented demand for iron and steel for new construction and for meeting the enormous wastage of the war made it practically impossible for the Bureau of Mines to obtain and hold the services of men having the requisite ability and experience for conducting some of the investigations projected for the year, as such men can now be of greater service in the employ of companies furnishing the Government with the iron and steel needed by the Army and the Navy.

During the year F. H. Willcox, metallurgical engineer, and H. A. Aston, metallurgist, left the Bureau of Mines to enter private employment.

HEALTH AND SAFETY AT BLAST FURNACES AND STEEL WORKS.

Investigations of the conditions affecting the health and safety of workmen at blast furnaces and steel plants were practically completed in the fiscal year 1916. Although no investigations were made during the past year, two reports dealing with blast-furnace accidents were revised for publication as Bureau of Mines bulletins and are now in press. These reports were written by F. H. Willcox, metallurgical engineer.

One of these bulletins, which deals with blast-furnace breakouts, explosions, and slips, discusses the evolution of blast-furnace practice in the use of finer ores, heavier furnace charges, and stronger blast pressures; it points out the troubles that furnace men have had to meet, the great progress made in furnace design, and the causes and the methods of preventing the three classes of accidents described.

The other bulletin, which represents the results of an investigation made in cooperation with the Pennsylvania department of labor and industry, deals with the causes of fatalities and injuries among workers at blast-furnace plants. This bulletin covers the entire field of blast-furnace accidents, each form of accident discussed being illustrated by summarized statements of actual occurrences, showing how the accident occurred and the severity of the injury received.

Although the bureau has temporarily suspended its work for safety at blast furnaces, it plans to study furnace processes and materials, with especial reference to the prevention of waste and the increase of efficiency in iron and steel making, as funds are made available.

INVESTIGATIONS OF BLAST-FURNACE SLAGS.

An investigation of the viscosity of iron blast-furnace slags was continued at the Pittsburgh station of the bureau during the year, with more men and better equipment in the laboratory. Before this investigation began, the blast-furnace operator lacked reliable data regarding the viscosity of the slag at different temperatures, although this relation bears directly on the production of desirable pig iron, economy in the use of fuel, and regularity and uniformity in the working of the furnace. The results of this investigation not only furnish metallurgists and furnace men with reliable data as a guide in the choice of operating conditions, but should stimulate the broadening of furnace practice to take care of the increasing need of smelting lean and complex ores.

Numerous pyrometric observations were made during the year at iron and steel plants, as well as simultaneous records of the different operating factors, and samples of slag, ore, limestone, coke, and flue dust were collected. Research is in progress to determine accurately the relation between the observations made at the different blast furnaces and the experiments made in the laboratories of the bureau. A report showing the results of this work will be published by the bureau.

During the year the methods of measurement, apparatus, and laboratory technique used in the viscosity investigations were described in a technical paper entitled "A new method for measuring the viscosity of blast-furnace slag at high temperatures."

Two reports giving the more recent results of the investigations have been submitted for publication by the Bureau of Mines as technical papers. One of these papers presents tables showing slag temperatures and viscosities for the use of the blast-furnace operator, and contains tables giving the viscosities, at temperatures of 1,350°, 1,400°, 1,450°, 1,500°, 1,550°, and 1,600° C., of slags ranging in composition from 7 to 24 per cent Al_2O_3, and 37 to 50 per cent lime. These tables therefore cover the usual range of composition in practice, and certain ranges that have not as yet been generally utilized.

The second report submitted, on the temperature-viscosity relations in the ternary system CaO–Al_2O_3–SiO_2, records the strictly scientific observations made in the course of the viscosity experiments. It is a contribution to present knowledge of the properties of the silicates at high temperatures, and bears directly on many subjects outside of iron metallurgy.

The experimental work performed during this investigation was carried on by A. L. Feild, assistant metallurgist, who was aided by P. H. Royster, junior physicist (during half the year). The necessary analytical work was done by N. A. Sargent, junior analytical chemist.

The slag investigations were under the general supervision of F. H. Willcox, metallurgical engineer, until his resignation on February 15, 1917, when the work was placed under the direction of Mr. Feild.

CORROSION OF METALS IN MINES.

Little work was done in the studies of the action of acid mine waters on the metals used in mine equipment. These studies had been in progress for a number of years. At the beginning of the fiscal year 1917, the data gathered through examination of equipment in those mines in which the corrosive agencies are particularly severe, such as bituminous coal mines in Pennsylvania and copper mines in Michigan, were being assembled for publication in a report that should show the corrosive effects of the waters, the experience of mine operators in handling the waters, and the metals and the grades of iron and steel that had proved most resistant to corrosion. In addition, preparations were made and equipment purchased for carrying on laboratory experiments with different metals to determine their suitability for mine service and for studying by electrochemical and metallographic methods the nature of the corrosion resistance of copper-bearing and other alloy metals.

James Storey, metallurgist, who had been in charge of the corrosion investigations, resigned his position with the Bureau of Mines early in the fiscal year 1917. After his resignation, on account of the difficulty of obtaining a competent metallurgist and the need of

the bureau doing work on other metallurgical problems, the corrosion investigations were temporarily discontinued. The bureau plans to resume these investigations as soon as conditions permit.

HYDROMETALLURGY OF GOLD AND SILVER.

At its Berkeley, Cal., station the Bureau of Mines is conducting investigations relating to the extraction of precious metals from their ores by hydrometallurgical methods. During the year a study of such methods used in the gold and silver districts of the United States was begun. For the sake of comparison and in order to become familiar with new developments the metallurgist in charge of the investigation visited all the mills of the Cobalt and Porcupine districts of northern Ontario, Canada, and examined their practice carefully.

Considerable information has been collected for a bulletin on the hydrometallurgy of gold and silver. The preparation of a short technical paper on the cyanide process, written in simple language for the information of the general public, is also well under way.

A study of the production, uses, and sale of the alkaline cyanides used in the cyanide process has recently been undertaken with the intent of rendering assistance to present and prospective producers of cyanide and thereby encourage greater production. It is thought inadvisable to conduct experiments on processes now seemingly being adequately developed, but preliminary steps have been taken to investigate certain old proposals that are not receiving adequate development.

In the course of the study of the cyanide process the following problems have definitely come to the attention of the Bureau of Mines:

1. Recovery of cyanide and precious metals from waste solutions.
2. Destruction of the cyanide in the very weak waste solutions discharged from cyanide plants with the tailing, so as to render the solutions harmless to animals and vegetation.
3. Treatment of oxidized silver ores, particularly those containing manganese.
4. Local production of cyanide from crude raw materials.

Provision for the investigation of these problems is being made through cooperation with private companies.

G. H. Clevenger, metallurgist, is in charge of the work for the Bureau of Mines.

IMPURITIES IN COMMERCIAL OXYGEN.

Through its Berkeley station the Bureau of Mines cooperated with the California Industrial Accident Commission in an investigation of several explosions of acetylene welding apparatus. The tests made

confirmed the results of similar tests at the Pittsburgh station by showing that the presence of hydrogen in the oxygen used in the apparatus caused the explosions.

CHEMICAL RESEARCH LABORATORIES.

ANALYTICAL LABORATORY.

Samples of fuel belonging to the Government and samples of fuels and various other substances collected in the course of investigations being made by the United States and by State geological surveys and experiment stations are analyzed in the general analytical laboratory at the Pittsburgh station.

These samples include coal, coke, peat, lignite, coal dust, mine-road dust, rock dust, coked dust (collected after mine explosions), coal ash, clinkers, slag, mine water, minerals, ores, metals, and miscellaneous materials.

During the year 375 samples of coal were received for analysis. These were collected in the course of various investigations and of cooperative work with the United States Geological Survey, Forest Service, Land Office, and the State geological surveys of Illinois, Maryland, and Tennessee.

From the mining division of the bureau there were received 1,156 samples of coal, road, stone, and coked dusts taken in the course of investigations of explosions and fires in coal mines; 2 samples of mine waters taken during a study of sanitary conditions at certain mines; 351 samples of rocks, drill cuttings, and rock dusts collected in connection with the investigation of silicosis among miners in the copper mines of the Butte, Mont., district; and 7 samples of miscellaneous materials, making a total of 1,524 samples from the mining division.

From the fuels and mechanical-equipment division of the bureau there were received 1,110 samples, mostly of coal, ash, clinker, and residual fuel, taken in connection with steaming and heating tests of coal for the Army, and combustion investigations having in view the more efficient utilization of coal in boiler furnaces. Of these samples 122 were from a series of locomotive tests made in cooperation with the Illinois Engineering Experiment Station at Urbana, Ill. Samples of gas coke, numbering 45, are included. These were taken in an investigation of the use of Illinois coals for the manufacture of illuminating gas, in cooperation with the Illinois Gas Association and the Illinois State Geological Survey.

From the metallurgical and the mineral-technology divisions of the bureau there were received for analysis 5 samples of slags, 3 samples of clay, 1 sample of marble, and 113 samples of gypsum.

From investigations being conducted in the chemical research laboratories there were received 35 samples of coal in connection with storage and spontaneous-combustion investigations; 3 samples of smut collected in connection with grain-dust explosions; and 42 samples of materials tested as absorbents of noxious gases.

In all 3,213 samples were received. Their analysis involved 28,289 determinations.

Considerable time was devoted to designing equipment and furnishings for the chemical laboratories in the building of the Bureau of Mines in Pittsburgh. During the months of April, May, and June all men available for investigative work were engaged in testing absorbents for noxious gases. New methods were devised for testing the efficiency of absorbents for four of the principal gases used in warfare.

A bulletin giving the analyses of mine samples of coal collected after June 30, 1913, was revised to June 30, 1916, and submitted for publication. In addition, three technical papers that discussed, respectively, the determination of combustible matter in silicate and carbonate rocks with reference to their suitability for rock-dusting coal mines, a portable apparatus and method for the rapid determination of incombustible matter in mixtures of coal dust and rock dust in mines, and the hydrogen-volatile matter ratio of American coals, and its use in reducing total heat of combustion to net heat of combustion, were prepared and submitted.

The personnel of the analytical laboratory during the year included: A. C. Fieldner, chemist in charge; W. A. Selvig and F. D. Osgood, assistant chemists; and G. H. Mengel, junior chemist; and also V. C. Allison, C. L. Boyle, C. W. Davis, H. V. Huber, C. R. Locke, G. E. Postma, C. S. Purcell, W. R. Collette, junior chemists; Morris Block and L. E. Ashim, analysts; W. E. Surbled, laboratory assistant; and W. E. Demby, laboratory helper, for different periods of time during the year.

INVESTIGATIONS OF THE FUSIBILITY AND CLINKERING OF COAL ASH.

During the year the investigation of various methods of determining the fusibility of coal ash, which was mentioned in the last annual report, was completed and an approved method of determining the fusibility was adopted. The tentative method of determining the fusibility in reducing atmospheres containing hydrogen and water vapor that was used during the previous year was greatly improved by substituting a modified gas-heated furnace in which the reducing atmosphere was maintained by using a large excess of gas above that required for complete combustion. This outfit, which is described in the bulletin on the fusibility of coal ash, is simple

and easily repaired, and its first cost is low. Six determinations can be made simultaneously.

A survey of the fusing temperature of the ash in mine samples of coal from Pennsylvania and West Virginia is in progress.

This investigation is being conducted by A. C. Fieldner, chemist, who had the aid of A. E. Hall and W. A. Selvig, assistant chemists, and of H. A. Depew, junior physical chemist, for various periods of time.

INVESTIGATION OF MINE GASES AND OF NATURAL GAS.

Analyses of mine gases and of natural gas are made in the laboratories of the Pittsburgh station. During the year approximately 2,500 gas samples were analyzed, including mine-air samples submitted by mining engineers of the bureau, mine operators, and State mine inspectors. These samples were collected in connection with investigations in mines after fires and explosions or in studying mine ventilation with a view to decreasing the hazard of mine explosions. A considerable number of samples of mixtures of natural gas and air and hydrogen-air mixtures were analyzed in connection with the testing of explosives, miners' lamps, and electrical apparatus used in mines. A number of natural gas samples from various States were analyzed and tested for their yield of gasoline.

During the year the following investigations were conducted: The influence of pressure on the low explosion limits of mixtures of hydrogen and oxygen; the accumulation of hydrogen and nitrogen in the breathing bag of mine-rescue apparatus; the interferometer as applied to gas analyses, with special reference to the presence of impurities in oxygen and hydrogen; the vitiation of the air in garages by the exhaust gas from the motor.

A bulletin on black damp in mines and two technical papers discussing, respectively, limits of complete inflammability of mine gas and of industrial gas, and vapor pressures of various compounds at low temperatures were issued during the year.

During the months of March, April, May and June, 80 per cent of the gas laboratory personnel was engaged on problems connected with the use of noxious gases in warfare. J. F. Duggar, jr., junior chemist, in cooperation with W. E. Gibbs, engineer, was engaged on the problem of removing carbon dioxide and hydrogen from the atmosphere of submarines. A satisfactory method of absorbing and removing CO_2 was developed and tested in actual practice. Work on the removal of hydrogen is being continued.

Methods have been devised for testing the efficiency of gas masks and of canisters containing absorbents for removing noxious gases from the air breathed. An inspection laboratory for testing finished masks and canisters has been installed temporarily at Pittsburgh

under the direction of A. C. Fieldner, chemist, and A. W. Gauger, junior chemist. Research work is also being conducted in the development of new and more efficient absorbing materials.

The investigation of mine gases and of natural gas was in charge of G. A. Burrell, chemist, from July 1 to October 31 and in charge of A. C. Fieldner, chemist, from November 1 to June 30. The personnel included: F. M. Seibert, assistant chemist, for a part of the year; A. W. Gauger, G. W. Jones, J. F. Duggar, jr., and W. C. Harpster, junior chemists, for the year; and H. J. Nichols, jr., analyst, for part of the year.

PHYSICAL LABORATORY.

The physical laboratory at the Pittsburgh station of the Bureau of Mines is equipped for testing and calibrating physical apparatus and measuring instruments used in the work of divisions of the bureau and for making a number of special tests that require apparatus not usually found in an ordinary laboratory. Other miscellaneous work of a physical nature is also done. Owing to the pressure of routine work and the demands that the bureau concentrate attention on problems relating to national preparedness, no research work was undertaken at the laboratory.

During the year 368 calibrations and tests were made. Over 100 thermocouples and resistance thermometers were made or repaired. A number of resistance coils were made and adjusted and a number of indicating instruments were repaired or adjusted. New equipment was designed and made for improving the methods and increasing the usefulness of the physical laboratory.

In comparison with the previous years the number of calibrations and tests increased more than 100 per cent over those of the fiscal year 1916 and approximately 200 per cent over those of the fiscal year 1915. More repair work has been done than in any previous year. Installation of new apparatus permits the testing of a larger variety of instruments than ever before; in addition, some instruments can be tested over a greater range.

J. K. Clement, physicist, was in charge of the laboratory until mustered into active service with the Pennsylvania National Guard. A. O. Ashman, laboratory assistant in physics, had charge of the laboratory for the remainder of the year.

PROGRESS OF SPECIAL INVESTIGATIONS.

PLACER-MINING METHODS.

An investigation of placer-mining methods throughout the United States, with especial reference to the obtaining of larger recoveries of gold and the reduction of accidents among miners, was completed.

A comprehensive report on this investigation, by Charles Janin, consulting engineer, will soon be issued as a bulletin of the Bureau of Mines. This report contains detailed information regarding placer-mining methods, the construction and operation of dredges, and the actual costs of mining under different conditions.

During the year a report by Hennen Jennings, consulting engineer, describing the construction and operation of the large gold dredges in the Alder Creek district, Montana, was published as a bulletin of the bureau.

SPECIAL GAS-PRODUCER INVESTIGATIONS.

The results of an investigation of gas-producer practice in the United States made during the previous fiscal year by R. H. Fernald, consulting engineer, were published during the fiscal year just closed as a bulletin entitled "Operating details of gas producers."

IRON-ORE MINING.

The large bulletin on mining and beneficiation of iron ores in the United States, on which D. E. Woodbridge, consulting engineer, had been working at intervals for a number of years, has been completed and is now in course of publication. This bulletin discusses the different iron ores mined in the United States, the development of the mining methods used in different districts, and the methods of treating low-grade ores by electric concentration, washing, and nodulizing.

IRON MAKING IN THE UNITED STATES.

A bulletin describing the progress of iron making in the United States with especial reference to the development of the modern blast furnace was completed by J. L. W. Birkinbine, consulting metallurgical engineer, and is now in course of publication.

MINE ECONOMICS.

The increasing complexity of the economic problems connected with the production and marketing of mineral products is making a study of the factors governing their production and use more and more essential.

The need of developing a sufficient supply of those essential minerals whose importation has been interrupted by the war has received special attention during the year. This is particularly true of those special mineral products that enter into explosives, military supplies, and fertilizers. Among these products are nitrate, pyrites, sulphur, platinum, mercury, steel-alloy metals, aluminum, antimony, magnesium, tin, graphite, and mica.

During the year, A. G. White, associate mine economist, studied the problems connected with the supply of war minerals and the relation of these problems to the work of the Bureau of Mines and of various Government agencies. Reports on each mineral that might be in short supply were prepared, as well as a detailed report on the sulphuric-acid situation as related to the supply of pyrite and sulphide ores. Assistance and information have been supplied to other offices of the Government that have been at work on different phases of the problem. Plans have been carried out for cooperative work with the national technical organizations to stimulate the domestic mineral production.

Work under way dealing with the fuel situation in the Western States has had to be temporarily suspended because of the importance of the special war work.

ADMINISTRATION.

FINANCIAL STATEMENT.

The total sum appropriated by Congress for the expenses of the Bureau of Mines during the fiscal year ended June 30, 1917, was $1,027,828.81. Below is a statement showing the appropriations for the year and the sum disbursed under each appropriation.

Amounts appropriated for and expended by the Bureau of Mines for the fiscal year ended June 30, 1917.

Title of appropriation.	Amount.	Repayments.	Available.	Disbursements.	Balance subject to voucher or claim.
General expenses	$70,000.00	.....	$70,000.00	$68,389.98	$1,610.02
Investigating mine accidents	347,000.00	$1,379.80	348,379.80	347,902.54	477.26
Testing fuel	135,000.00	.....	135,000.00	134,372.32	627.68
Mineral-mining investigations	100,000.00	.....	100,000.00	99,180.52	819.48
Inspecting mines in Alaska	7,000.00	.....	7,000.00	4,710.10	2,289.90
Books and publications	1,500.00	.....	1,500.00	1,500.00	.....
Land for mine rescue cars	1,000.00	.....	1,000.00	.....	1,000.00
Investigations of petroleum and natural gas	70,000.00	.....	70,000.00	69,427.75	572.25
Removal mining experiment station, Pittsburgh, Pa	89,468.81	.....	89,468.81	43,251.18	[a]46,217.63
Care, etc., new buildings, Pittsburgh, Pa	4,305.00	.....	4,305.00	12.00	4,293.00
Purchase of mine rescue cars	53,000.00	.....	53,000.00	52,998.00	2.00
Equipment for mine rescue cars	13,500.00	.....	13,500.00	13,460.14	39.86
Operating mine rescue cars	35,000.00	.....	35,000.00	31,068.37	3,931.63
Expenses mining experiment stations	75,000.00	.....	75,000.00	74,025.91	974.09
Reconstruction and repairs of mine rescue cars	26,055.00	.....	26,055.00	25,908.19	146.81
Total	1,027,828.81	1,379.80	1,029,208.61	966,207.00	63,001.61

[a] This balance added to and made part of an appropriation for the identical purposes for the fiscal year 1918, under authority contained on page 46 in the sundry civil act approved June 12, 1917.

MAILS AND FILES.

The number of pieces of all classes of mail handled in the Washington office of the bureau aggregated about 325,000, of which nearly 50 per cent consisted of general inquiries from the public for information and assistance in various problems connected with the prosecution and development of the mineral industries. The work of handling the correspondence required the services of a clerk in charge and of two filing and withdrawal clerks.

PERSONNEL.

On June 30, 1917, there were 550 employees on duty in the Bureau of Mines, 459 of whom held Secretary's appointments, they being distributed and classified as indicated in the following table:

Number of appointees on duty in the Bureau of Mines, June 30, 1917.

Location.	Classification and number of appointees.			
	Technical.	Clerical.	Noncleri-cal.	Total.
Washington	[a] 26	48	[b] 27	101
Pittsburgh	[c] 79	27	[d] 45	151
Field in general	[e] 149	34	24	207
Total	254	109	96	459

[a] Engineers, 9; chemists, 9; miscellaneous, 8.
[b] Includes such employees as elevator conductor, electrician, watchman, messenger, and laborer.
[c] Engineers, 41; chemists, 29; miscellaneous, 9.
[d] Includes such employees as fireman, watchman, oiler, carpenter, shot firer, janitor, machinist's helper, and laborer.
[e] Engineers, 58; chemists, 26; miscellaneous, 65, including miners.

In addition to the employees enumerated in the table, there were 91 unskilled laborers, including cooks, employed on field agreements, 43 of whom were in Pittsburgh and 48 in the field in general, or a total of 550 employees on duty June 30, 1917, an increase of 51 appointees and an increase of 69 on field agreements as compared with the preceding fiscal year.

The total number of changes in status requiring the approval of the Secretary of the Interior and consisting of appointments, reinstatements, transfers, promotions, reductions, separations, extensions of limited appointments, etc., was 658. The number of changes in status on field agreements issued by the director with the approval of the Secretary of the Interior and including employment, separation, promotion, or reduction, was 372, or a total of 1,030 in all, being an increase of 306 from the preceding fiscal year.

PUBLICATIONS.

The published reports of the Bureau of Mines comprise three main classes—bulletins, technical papers, and miners' circulars. In addition, the bureau issues various lists and schedules, a monthly statement of fatalities in coal mines, and the annual report of the director.

The bulletins include in general those reports that present in detail the results of technical and scientific investigations, and therefore are of interest chiefly to engineers, chemists, mine officials, and other persons familiar with the subjects discussed. The technical papers are shorter and less formal than the bulletins, and contain preliminary statements on the results or the progress of broad investigations, or describe those small investigations that are incidental to larger ones. The miners' circulars deal with such practical matters as accident prevention and rescue and first-aid methods, the safeguarding of health, and other topics that directly concern the workers in mines, mills, and metallurgical plants. In order that they may be of most value to the persons to whom they are addressed, the circulars are written in simple, nontechnical English, and are printed in much larger editions than are the bulletins and technical papers.

The bulletins, technical papers, and miners' circulars issued during the fiscal year ended June 30, 1917, are summarized in the following statement:

BULLETINS.

Bulletin 105. Black Damp in Mines, by G. A. Burrell, I. W. Robertson, and G. G. Oberfell. 1916. 92 pp.

Presents results of analyses of mine air and discusses the physiological effects of the constituents of black damp.

Bulletin 107. Prospecting and Mining of Copper Ore at Santa Rita, N. Mex., by Donald F. MacDonald and Charles Enzian. 1916. 122 pp., 10 pls., 20 figs.

Presents a detailed study of mining operations and costs. Also discusses time keeping, accounts, and warehouse methods.

Bulletin 108. Melting Aluminum Chips, by H. W. Gillett and G. M. James. 1916. 88 pp.

Discusses the losses of aluminum in melting the scrap metal and the various preventive methods tested.

Bulletin 109. Operating Details of Gas Producers, by R. H. Fernald. 1916. 74 pp.

Discusses present status of producer-gas plants and their uses. Also gives character of fuel used and data on fuel consumption.

Bulletin 111. Molybdenum; Its Ores and Their Concentration, with a Discussion of Market, Prices, and Uses, by F. W. Horton. 1916. 132 pp., 18 pls., 2 figs.

Describes molybdenum deposits and molybdenum industry in the United States.

Bulletin 119. Analyses of Coals Purchased by the Government During the Fiscal Years 1908–1915, by G. S. Pope. 1916. 118 pp.

Gives analyses of samples representing deliveries of coal purchased for the Government under specifications.

Bulletin 120. Extraction of Gasoline from Natural Gas by Absorption Methods, by G. A. Burrell, P. M. Biddison, and G. G. Oberfell. 1917. 71 pp., 2 pls., 15 figs.

Describes experiments and gives cost of an absorption plant.

Bulletin 121. The History and Development of Gold Dredging in Montana, by Hennen Jennings, with a chapter on Placer-Mining Methods and Operating Costs, by Charles Janin. 1916. 64 pp., 29 pls., 1 fig.

Presents cost figures and other data of interest.

Bulletin 122. The Principles and Practice of Sampling Metallurgical Materials, with Special Reference to the Sampling of Copper Bullion, by Edward Keller. 1916. 102 pp., 13 pls., 31 figs.

Discusses theory of sampling and its application. Describes procedure and equipment in detail.

Bulletin 124. Sandstone Quarrying in the United States, by Oliver Bowles. 1917. 143 pp., 6 pls., 19 figs.

A general discussion, with descriptions of methods used at different quarries.

Bulletin 125. The Analytical Distillation of Petroleum, by W. F. Rittman and E. W. Dean. 1916. 79 pp., 1 pl., 16 figs.

Presents results of experiments in distillation methods, the efficiencies of types of fractionation apparatus, and the effect of cracking as a factor in the analytical distillation of petroleum in still heads.

Bulletin 126. Abstracts of Current Decisions on Mines and Mining, reported from January to April, 1916, by J. W. Thompson. 1916. 90 pp.

Bulletin 128. Refining and Utilization of Georgia Kaolins, by I. E. Sproat. 1916. 55 pp., 5 pls., 11 figs.

Discusses practicability of applying technical control of clay disperse systems to kaolin refining and the utilization of the prepared clay in the manufacture of vitreous china and wall tile.

Bulletin 133. The Wet Thiogen Process for Recovering Sulphur from Sulphur Dioxide in Smelter Gases, a Critical Study, by A. E. Wells. 1917. 66 pp.

Gives results of an exhaustive series of tests and indicates possibilities of the process.

Bulletin 134. The Use of Mud-Laden Fluid in Oil and Gas Wells, by J. O. Lewis and W. F. McMurray. 1916. 86 pp., 3 pls., 18 figs.

Discusses wastes from faulty methods and the advantages of using mud-laden fluid.

Bulletin 138. Coking of Illinois Coal, by F. K. Ovitz. 1917. 71 pp.

Discusses experiments with coal from different mines and beds; indicates possibility of developing the use of coke from Illinois coal.

Bulletin 142. The Mining Industry in the Territory of Alaska during the Calendar Year 1915, by S. S. Smith. 1917. 65 pp.

Summarizes progress of mining and gives information regarding mine inspection and mine accidents.

Bulletin 143. Abstracts of Current Decisions on Mines and Mining, Reported from May to August, 1916, by J. W. Thompson. 1917. 72 pp.

Bulletin 147. Abstracts of Current Decisions on Mines and Mining, reported from September to December, 1916, by J. W. Thompson. 1917. 81 pp.

Technical Papers.

Technical Paper 82. Oxygen Mine Rescue Apparatus and Physiological Effects on Users, by Yandell Henderson and J. W. Paul. 1917. 102 pp., 5 pls., 6 figs.

Discusses necessary requirements of breathing apparatus, defects of various models, and suggested improvements.

Technical Paper 86. Ore-Sampling Conditions in the West, by T. R. Woodbridge. 1916. 96 pp., 5 pls., 17 figs.

Presents results of an investigation of practice at different mills and sampling plants.

Technical Paper 87. Methods of Testing Natural Gas for Gasoline Content, by G. A. Burrell and G. W. Jones. 1916. 26 pp., 7 figs.

Describes methods and results of tests.

Technical Paper 102. Health Conservation at Steel Mills, by J. A. Watkins. 1916. 36 pp.

Discusses the need of medical supervision of employees, the construction of buildings, and standards of sanitation.

Technical Paper 103. Organizing and Conducting Safety Work in Mines, by H. M. Wilson and J. R. Fleming. 1917. 57 pp., 35 figs.

Outlines organization and discusses safety measures and equipment.

Technical Paper 106. Asphyxiation from Blast-Furnace Gas, by F. H. Willcox. 1916. 79 pp., 8 pls., 11 figs.

Discusses nature and causes of gas poisoning; suggests safeguards and points out precautions to be taken.

Technical Paper 130. Underground Waters in Oil and Gas Fields and Methods of Prevention, by W. F. McMurray and J. O. Lewis. 1916. 28 pp., 1 pl., 8 figs.

Discusses waste of oil and gas by the flooding of sands with water. Gives reasons for conservation. Describes effects of unsystematic casing of wells.

Technical Paper 132. Underground Latrines for Mines, by J. H. White. 1916. 23 pp., 2 pls., 7 figs.

Discusses need of sanitation in mines in order to prevent disease.

Technical Paper 135. Bibliography of Recent Literature on Flotation of Ores, January to June, 1916, compiled by D. A. Lyon, O. C. Ralston, F. B. Laney, and R. S. Lewis. 1917. 20 pp.

Technical Paper 136. Safe Practice at Blast Furnaces, by F. H. Willcox. 1916. 73 pp., 1 pl., 43 figs.

A study of the causes of accidents and methods for their prevention.

Technical Paper 137. Combustion in the Fuel Bed of Hand-Fired Furnaces, by Henry Kreisinger, F. K. Ovitz, and C. E. Augustine. 1916. 76 pp., 2 pls., 21 figs.

Discusses feeding coal and air in four types of commercial furnaces. Describes the gas-sampling and temperature measurements at various depths in the fuel bed. Shows relations between air supply and rate of combustion.

Technical Paper 138. Suggested Safety Rules for Installing and Using Electrical Equipment in Bituminous Coal Mines, by H. H. Clark and C. M. Means. 1916. 36 pp.

Suggested rules are based on tests and investigations and conferences with electrical engineers.

Technical Paper 140. The Primary Volatile Products of the Carbonization of Coal; A Sequel to Bulletin 1, The Volatile Matter of Coal, by G. B. Taylor and H. C. Porter. 1916. 59 pp., 1 pl., 25 figs.

Treats of experiments with four different coals and the volatile products obtained by distillation at different temperatures.

Technical Paper 142. Vapor Pressures of Various Compounds at Low Temperatures, by G. A. Burrell and I. W. Robertson. 1916. 118 pp., 10 figs.

Describes the separation of gas mixtures by fractional distillation and the vapor-pressure measurements obtained.

Technical Paper 143. The Ores of Copper, Lead, Gold, and Silver, by Charles H. Fulton. 1916. 41 pp.

Classifies the ores mentioned and lists their mineral constituents.

Technical Paper 146. The Nitration of Toluene, by E. J. Hoffman. 1916. 32 pp.

Discusses experiments on the preparation of trinitrotoluene.

Technical Paper 147. The Absorption of Methane and other Gases by Coal, by S. H. Katz. 1917. 22 pp., 4 figs.

Presents the results of laboratory tests with Pittsburgh coal.

Technical Paper 149. Answer to Questions on the Flotation of Ores, by O. C. Ralston. 1917. 30 pp.

Gives information regarding many points not discussed at length in existing literature.

Technical Paper 150. Limits of Complete Inflammability of Mixtures of Mine Gases and of Industrial Gases with Air, by G. A. Burrell and A. W. Gauger. 1917. 13 pp., 2 figs.

Gives explosive limits for methane, acetylene, ethane, hydrogen, carbon monoxide, illuminating gas, natural gas, and blast-furnace gas.

Technical Paper 153. Occurrence and Mitigation of Injurious Dusts in Steel Works, by J. A. Watkins. 1917. 20 pp., 4 pls.

Describes methods of sampling dusty air and ways of reducing the dust hazard.

Technical Paper 156. Carbon Monoxide Poisoning in the Steel Industry, by J. A. Watkins. 1917. 19 pp., 1 fig.

Discusses physiological effects and occurrence of carbon monoxide; also means of reducing the danger to workmen.

Technical Paper 157. A Method for Measuring the Viscosity of Blast-furnace Slag at High Temperatures, by A. L. Feild. 1916. 29 pp., 1 pl., 7 figs.

Describes a new method for determining viscosity and the development of a suitable electric furnace. A number of viscosity measurements illustrate the application of the method.

Technical Paper 159. Production of Explosives in the United States During the Calendar Year 1915, With Notes on Coal-Mine Accidents Due to Explosives, and a List of Permissible Explosives, Lamps, and Motors Tested Prior to June 1, 1916, compiled by A. H. Fay. 1916. 24 pp.

Technical Paper 160. The Determination of Nitrogen in Substances Used in Explosives, by W. C. Cope and G. B. Taylor. 1917. 46 pp., 1 pl., 4 figs.

Discusses Dumas, Kjeldahl, and phosphorus iodide methods for nitrogen and the use of nitrometers; contains useful tables.

Technical Paper 161. Construction and Operation of a Single-Tube Cracking Furnace for Making Gasoline, by C. P. Bowie. 1916. 16 pp., 10 pls.

Outlines principles involved in the cracking of oils and distillate by the Rittman process; describes construction of furnace used, and gives details of operations.

Technical Paper 163. Physical and Chemical Properties of Gasolines Sold Throughout the United States During the Calendar Year 1915, by W. F. Rittman, W. A. Jacobs, and E. W. Dean. 1916. 42 pp.

Gives results of testing fifty-two samples of gasoline; also specifications for purchase and sale of gasoline.

Technical Paper 164. Accidents at Metallurgical Works in the United States During the Calendar Year 1915, compiled by A. H. Fay. 1916. 20 pp.

This is the second annual report on accidents at metallurgical works. The data presented were collected through the cooperation of the officials and managers of metallurgical companies.

Technical Paper 165. Quarry Accidents in the United States During the Calendar Year 1915, compiled by A. H. Fay. 1917. 77 pp., 1 pl.

Technical Paper 166. Motor Gasoline; Properties, Laboratory Methods of Testing, and Practical Specifications, by E. W. Dean. 1917. 27 pp.

A concise statement of the problem of gasoline specifications, with recommendations.

Technical Paper 168. Metal-Mine Accidents in the United States During the Calendar Year 1915, compiled by A. H. Fay. 1917. 114 pp., 2 figs.

Miners' Circular.

Miners' Circular 23. Elementary First Aid For the Miner, by W. A. Lynott and D. Harrington. 1916. 24 pp., 19 figs.

Gives directions for first-aid treatment for the more common injuries. This circular is also printed in Italian, Polish, and Slovak.

EDITING OF PUBLICATIONS.

As the number of investigations undertaken by the bureau has increased, the number of reports prepared for publication has become larger and the amount of editorial work to be done has necessarily grown. In spite of the absence for more than two months of the engineer in charge of the editorial section, the amount of work handled was greater than during the previous year.

The work of the editorial section includes not only the editing of manuscript and the reading of proof of all reports, lists, and forms printed for the bureau but also the examining of all material submitted for illustrations and the preparation of accepted material for engraving.

During the year 19 bulletins, 30 technical papers, and 1 miners' circular were published, as follows: Bulletins 105, 107, 108, 109, 111, 119, 120, 121, 122, 124, 125, 126, 128, 133, 134, 138, 142, 143, 147; Technical Papers 82, 86, 87, 102, 103, 106, 130, 132, 135, 136, 137, 138, 140, 142, 143, 146, 147, 149, 150, 153, 156, 157, 159, 160, 161, 163, 164, 165, 166, 168; Miners' Circular 23. The contents of these publications have been summarized in the preceding statement.

The other reports published included the annual report of the director, 12 monthly statements of coal-mine fatalities in the United States, a report on rescue and recovery methods in mines, lists of publications and statements relating to the progress of investigations, and a list of the members of the bureau.

Twelve bulletins, 7 technical papers, and 13 miners' circulars were reprinted in one or more editions.

In addition to the work done on the publications enumerated, the text of 38 other publications was edited, and illustrations for 31 of these were prepared for engraving.

The editorial work was in charge of S. Sanford, engineer.

DISTRIBUTION OF PUBLICATIONS.

The Bureau of Mines, during the fiscal year 1917, distributed 802,926 copies of publications as against 693,256 for the previous year, a gain of 109,670. The distribution included 72,883 copies of bulletins, 479,149 of miners' circulars, 129,000 of technical papers, 2,294 of annual reports, and 119,600 of miscellaneous publications. There was a decrease in the copies of bulletins and technical papers distributed and an increase of 161,147 in miners' circulars.

The number of letters received, which is the criterion of the amount of interest the public is taking in the work of the Bureau of Mines, was 60,859 as against 94,715, a decrease of 33,856. This decrease is undoubtedly due in part to the war and the interest in problems that relate directly to national defense.

The distribution of the Bureau of Mines publications continued in charge of J. L. Cochrane, statistician.

LIBRARY.

The library system of the Bureau of Mines consists of a central or administrative library in Washington and branch libraries at the several experiment stations. Three new stations were established during the past year. The branch libraries are at Pittsburgh, Pa.; Golden, Colo.; Salt Lake City, Utah; Tucson, Ariz.; San Francisco, Cal.; Berkeley, Cal.; Fairbanks, Alaska; Seattle, Wash.; Urbana, Ill.; and Ithaca, N. Y. The branch library at each station is supplied with special collections of technical books and periodicals necessary to the work of that station. Printed catalogue cards for subject indexes are also sent with the books, if desired. All books are interchangeable between the stations through the main library where the books are purchased, catalogued, and charged. The librarian endeavors to keep in touch with the work of each station in order to render the most effective and practical service.

For economy and efficiency of administration the library of the bureau in Washington and the library of the United States Geological Survey have been brought together in the new Interior Department Building. The mining and technical books of the Survey library will be combined in a section of mining and mineral technology, with the greater part of the Bureau of Mines library, being classified under the Library of Congress classification. The books in both libraries that relate to pure geology will be placed in a section of geology, under the Geological Survey classification. There will be one main catalogue for the library and one central charging desk for users.

During the fiscal year 1,900 volumes were added to the library.

Mrs. Edith F. Spofford, assistant librarian, is in charge of the library at the Washington office.

The library at the Pittsburgh experiment station contains about 6,600 volumes and about 600 pamphlets dealing with science, technology, and industrial safety and hygiene. During the year about 200 periodicals were received. These were examined and the more important papers were indexed in the semimonthly Library Bulletin, issued in mimeographed form by the station. To improve the catalogues and indexes of the library about two-thirds of the total number of books were recatalogued. The total number of publications circulated among the employees of the bureau amounted to about 2,700. The translations made during the year included articles in French, German, Russian, Swedish, and Italian publications.

ADMINISTRATION OF THE PITTSBURGH STATION.

The administrative work of the Pittsburgh station was in charge of Lauson Stone, as superintendent. This work comprises six divisions, as follows: Technical service, clerical, purchases and supplies, library and translations, shops and power plant, care of buildings and grounds.

The chief clerk of the station, W. R. Talbot, had general supervision of all the clerical work. The purchasing office, accounting, and the receiving, shipping, and supply room were in charge of J. H. Robison, the purchasing officer. The supervision of the shops and power plant was in charge of a mechanical superintendent. The custodian of the buildings and grounds had general supervision of the labor force, the janitors, and the watchmen.

TECHNICAL SERVICE.

The technical service does computing, drafting, photographic, and motion-picture work for other divisions of the bureau. Its work includes the averaging of test and laboratory observations, the computation and compilation of results of technical investigations, the design of apparatus and equipment for experimental work, the preparation of mine-disaster maps, drafting lay-outs of offices and laboratories in new buildings, the engrossing of mine-rescue and first-aid certificates, making charts for use as lantern slides, preparing illustrations for published reports, and producing and distributing motion pictures showing methods and safe practices in mineral industries.

LAWS GOVERNING THE WORK OF THE BUREAU.

NEW ORGANIC ACT.

The revised organic act of the Bureau of Mines was signed by the President on February 25, 1913. The text of this act (37 Stat., 681) is as follows:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the act to establish in the Department of the Interior a Bureau of Mines, approved May sixteenth, nineteen hundred and ten, be, and the same is hereby, amended to read as follows:

"That there is hereby established in the Department of the Interior a bureau of mining, metallurgy, and mineral technology, to be designated the 'Bureau of Mines,' and there shall be a director of said bureau, who shall be thoroughly equipped for the duties of said office by technical education and experience, and who shall be appointed by the President, by and with the advice and consent of the Senate, and who shall receive a salary of $6,000 per annum; and there shall also be in said bureau such experts and other employees, to be appointed by the Secretary of the Interior, as may be required to carry out the purposes of this act in accordance with the appropriations made from time to time by Congress for such purposes.

"SEC. 2. That it shall be the province and duty of the Bureau of Mines, subject to the approval of the Secretary of the Interior, to conduct inquiries and scientific and technologic investigations concerning mining, and the preparation, treatment, and utilization of mineral substances with a view to improving health conditions and increasing safety, efficiency, economic development, and conserving resources through the prevention of waste in the mining, quarrying, metallurgical, and other mineral industries; to inquire into the economic conditions affecting these industries; to investigate explosives and peat; and on behalf of the Government to investigate the mineral fuels and unfinished mineral products belonging to or for the use of the United States, with a view to their most efficient mining, preparation, treatment, and use; and to disseminate information concerning these subjects in such maner as will best carry out the purposes of this act.

"SEC. 3. That the director of said bureau shall prepare and publish, subject to the direction of the Secretary of the Interior, under the appropriations made from time to time by Congress, reports of inquiries and investigations, with appropriate recommendations of the bureau, concerning the nature, causes, and prevention of accidents, and the improvement of conditions, methods, and equipment, with special reference to health, safety, and prevention of waste in the mining, quarrying, metallurgical, and other mineral industries; the use of explosives and electricity, safety methods and appliances, and rescue and first-aid work in said industries; the causes and prevention of mine fires; and other subjects included under the provisions of this act.

"SEC. 4. In conducting inquiries and investigations authorized by this act neither the director nor any member of the Bureau of Mines shall have any personal or private interest in any mine or the products of any mine under investigation, or shall accept employment from any private party for services in the examination of any mine or private mineral property, or issue any report as to the valuation or the management of any mine or other private mineral property: *Provided*, That nothing herein shall be construed as preventing the temporary employment by the Bureau of Mines at a compensation not to exceed $10 per day, in a consulting capacity or in the investigation of special subjects, of any engineer or other expert whose principal professional practice is outside of such employment by said bureau.

"SEC. 5. That for tests or investigations authorized by the Secretary of the Interior under the provisions of this act, other than those performed for the Government of the United States, or State governments within the United States, a reasonable fee covering the necessary expenses shall be charged, according to a schedule prepared by the Director of the Bureau of Mines and approved by the Secretary of the Interior, who shall prescribe rules and regulations under which such tests and investigations may be made. All moneys received from such sources shall be paid into the Treasury to the credit of miscellaneous receipts.

"SEC. 6. That this act shall take effect and be in force on and after its passage."

AUTHORIZATION FOR PUBLISHING REPORTS.

The authority of the bureau for publishing reports is found in the joint resolution (36 Stat., 883) of Congress, approved June 25, 1910, as follows:

That the publications of the Bureau of Mines shall be published in such editions as recommended by the Secretary of the Interior, but not to exceed 10,000 copies for the first edition.

SEC. 2. That whenever the edition of any of the publications of the Bureau of Mines shall have become exhausted and the demand for it continues there shall be published, on the requisition of the Secretary of the Interior, as many additional copies as the Secretary of the Interior may deem necessary to meet the demand.

ACT PROVIDING FOR MINING-EXPERIMENT AND MINE-SAFETY STATIONS.

The act (40 Stat., 969), approved March 3, 1915, which authorizes the Secretary of the Interior to establish and maintain mining-experiment and mine-safety stations under the Bureau of Mines is as follows:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Interior is hereby authorized and directed to establish and maintain in the several important mining regions of the United States and the Territory of Alaska, as Congress may appropriate for the necessary employees and other expenses, under the Bureau of Mines and in accordance with the provisions of the act establishing said bureau, ten mining experiment stations and seven mine-safety

stations, movable or stationary, in addition to those already established, the province and duty of which shall be to make investigations and disseminate information with a view to improving conditions in the mining, quarrying, metallurgical, and other mineral industries, safeguarding life among employees, preventing unnecessary waste of resources, and otherwise contributing to the advancement of these industries: *Provided*, That not more than three mining-experiment stations and mine-safety stations hereinabove authorized shall be established in any one fiscal year under the appropriations made therefor.

SEC. 2. That the Secretary of the Interior is hereby authorized to accept lands, buildings, or other contributions from the several States offering to cooperate in carrying out the purposes of this act.

REPORT OF THE ST. ELIZABETHS HOSPITAL.

OFFICERS OF THE HOSPITAL.

BOARD OF VISITORS.

Brig. Gen. WILLIAM C. GORGAS, Surgeon General, U. S. A., President of the Board.
Mrs. HENRY G. SHARPE.
Mr. LEWIS E. SMOOT.
Mrs. ARCHIBALD HOPKINS.
WALTER S. HARBAN, D. D. S.
RUPERT BLUE, M. D., Surgeon General, P. H. S.
Rear Admiral WILLIAM C. BRAISTED, Surgeon General, U. S. N.
Mr. GILBERT H. GROSVENOR.

Executive Committee of the Board.

Dr. BLUE, Dr. BRAISTED, Mr. SMOOT.

Chaplains.

Rev. C. H. BUTLER.
Rev. W. G. DAVENPORT.
Rev. JOHN E. HORSTKAMP.
Rev. HUGH T. STEVENSON.
Rev. GEO. M. CUMMINGS.

MEDICAL STAFF.

Superintendent.

WILLIAM A. WHITE, M. D.

First Assistant Physician.

ROSS MCC. CHAPMAN, M. D.

Clinical Directors.

MARY O'MALLEY, M. D.
JAMES C. HASSALL, M. D.

Scientific Director.

S. I. FRANZ, A. B., Ph. D., LL. D., M. D.

Clinical Psychiatrist.

EDWARD J. KEMPF, M. D.

Assistant Clinical Psychiatrist.

LUCILE DOOLEY, Ph. D.

Senior Assistant Physicians.

ALFRED GLASCOCK, M. D.
BERNARD GLUECK, M. D.[1]
JOHN E. LIND, M. D.
JOHN A. PFEIFFER, M. D.

Assistant Physicians.

JOHN P. H. MURPHY, M. D.
ARRAH B. EVARTS, M. D.
D. G. O'NEIL, M. D.
LOUIS WENDER, M. D.[1]
DENNIS J. MURPHY, M. D.[1]
ANITA A. WILSON, M. D.
MILDRED E. SCHEETZ, M. D.

[1] Resigned.

Junior Assistant Physicians.

HAGOP DAVIDIAN, M. D.
DAVID G. SAMPSON, M. D.
JAMES F. HOOKER, M. D.
HELEN D. KEMPF, M. D.
JOSEPH NACK, M. D.[1]
LEON E. DUVALL, M. D.
SAMUEL A. SILK, M. D.

Medical Internes.

DUDLEY C. KALLOCH, M. D.[1]
VACHELLE E. HARMON, M. D.
WM. D. NAPHEYS, M. D.[1]
PERCY C. ANDERS, M. D.[1]
BURGH S. BURNET, M. D.

Military Assignments.

From the Navy.
ROBERT F. SHEEHAN, M. S., M. D.,[2]
Passed Assistant Surgeon, U. S. N.
DALLAS G. SUTTON, M. D.,
Passed Assistant Surgeon, U. S. N.

From the Army.
PAUL L. FREEMAN, M. D., Captain Medical Corps, U. S. A.

Histopathologist.[3]

Assistant in Psychology.

KARL S. LASHLEY.
LUCILE DOOLEY, Ph. D.

Visiting Dentist.

A. D. WEAKLEY, D. D. S.

Dental Internes.

NEAL A. HARPER, D. D. S.[1]
WALTER G. DOHERTY, D. D. S.[1]
ADOLPH JACOBS, D. D. S.

Visiting Ophthalmologist.

ARTHUR H. KIMBALL.

Veterinarian.

JOHN P. TURNER, V. D. M.

Steward and Disbursing Agent.

MONIE SANGER.

Chief Clerk.

FRANK M. FINOTTI.

Purchasing Agent.

A. E. OFFUTT.

Matron.

H. O'BRIEN.

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[1] Resigned. [2] Attached to U. S. S. *Calgoa* September, 1916. [3] Position vacant.

Chief of Training School.

Miss Alice Vaughn.

CONSULTING STAFF.

Internal Medicine.

Dr. S. S. Adams.
Dr. G. W. Cook.
Dr. Sterling Ruffin.
Dr. James D. Morgan.

General Surgery.

Dr. L. H. Taylor.
Dr. G. T. Vaughan.
Dr. W. P. Carr.
Dr. Chas. S. White.
Dr. James F. Mitchell.

Consulting Alienist.

Dr. D. Percy Hickling.

Gynæcology.

Dr. Joseph Taber Johnson.
Dr. J. W. Boveé.
Dr. I. S. Stone.

Ophthalmology.

Dr. D. K. Shute.
Dr. W. K. Butler.

Laryngology.

Dr. C. W Richardson.
Dr. J. J. Richardson.
Dr. W. A. Wells.
Dr. F. T. Chamberlain.

Genito-Urinary Diseases.

Dr. E. F. King.[1]

Medical Zoology.

Dr. C. W. Stiles.
Dr. Thomas A. Claytor.

Dermatology.

Dr. Randolph Bryan Carmichael.
Dr. H. H. Hazen.

[1] Died.

REPORT OF ST. ELIZABETHS HOSPITAL.

WASHINGTON, D. C., *July 1, 1917.*

SIR: The board of visitors for St. Elizabeths Hospital have the honor to submit the sixty-second annual report of the hospital, consisting of the report of the superintendent for the fiscal year ended June 30, 1917, and his recommendations.

Respectfully,

WM. C. GORGAS,
President of the Board of Visitors.
WM. A. WHITE, M. D.,
Superintendent, Secretary of the Board Ex Officio.

The SECRETARY OF THE INTERIOR.

REPORT OF THE SUPERINTENDENT.

MOVEMENTS OF POPULATION.

On June 30, 1917, there were remaining in the hospital 3,244 patients, as against 3,193 remaining June 30, 1916, an increase of 51 patients over the previous year. There were admitted during the year 898 patients, which was the largest number the hospital ever received in one year. The total number of patients treated during the year was 4,091. The number of discharges, including deaths, was 847. The daily average population was 3,209, as against 3,123 for the year 1915–16, an increase of 86 patients.

Movement of population, fiscal year ended June 30, 1917.

	Male.		Female.		Total.
	White.	Colored.	White.	Colored.	
Remaining June 30, 1916	1,927	414	543	309	3,193
Admitted during year 1916–17	542	126	146	84	898
Total number under treatment during the year ending June 30, 1917	2,469	540	689	393	4,091
Discharged:					
Recovered	132	19	37	12	200
Improved	55	6	23	8	92
Unimproved	60	12	14	14	100
Not insane	17	2	.....	1	20
Died	243	83	70	39	435
Total discharged and died	507	122	144	74	847
Remaining June 30, 1917	1,962	418	545	319	3,244

ADMINISTRATIVE DEPARTMENT.

Office of Steward and Disbursing Agent.

FARM AND GARDEN PRODUCTS.

Fruits and vegetables raised during the year ended June 30, 1917.

Articles.	Quantity.	Value.	Articles.	Quantity.	Value.
Apples:			Parsley...bunches..	15,150	$454.50
Crab...bushels..	30	$30.00	Pears...bushels..	219	219.00
Green...barrels..	121	173.20	Peas:		
Beans:			Green...do....	57	113.00
Lima...bushels..	55	82.51	Black-eye...do....	2	4.50
String...barrels..	104	238.00	Peppers, green...do....	262	392.25
Beets...bunches..	3,149	94.47	Pork, fresh...pounds..	14,176	1,417.60
Cabbage...barrels..	281	385.00	Plums...bushels..	15	22.50
Cantaloupes...single..	7,414	370.70	Potatoes:		
Carrots...bunches..	34,850	1,045.50	Irish...do....	1,466	1,140.53
Celery...do....	16,210	810.50	Sweet...do....	164	164.00
Cherries...quarts..	360	36.00	Pumkins...single..	1,830	146.40
Chicken...pounds..	1,283	263.96	Radishes...bunches..	14,002	420.06
Corn, green...ears..	10,118	101.18	Spinach...barrels..	131	163.63
Cucumbers...single..	5,342	53.42	Squash, summer...single..	7,585	227.55
Currants...quarts..	40	4.00	Tomatoes, green...bushels..	1,583	1,186.88
Eggs...dozen..	3,268	1,186.75	Turnips...do....	3	1.88
Eggplant...single..	7,386	369.30	Watermelons...single..	1,273	190.95
Grapes...pounds..	15,040	451.20	Veal...pound..	103	14.40
Kale...do....	270	269.50	Oyster plant...	6,550	327.50
Lettuce...heads..	15,423	771.15	Turnip tops...barrels..	2	1.40
Milk...gallons..	147,022	29,404.40			
Onions...barrels....	5	10.30	Total...	...	43,781.22
Onions...bunches..	3,405	1,021.65			

Forage and feed raised on farm during year ended June 30, 1917.

Articles.	Quantity.	Value.	Articles.	Quantity.	Value.
Corn:			Hay, green—Continued		
Ear...barrels..	53	$265.00	Cowpeas...tons..	98	$735.00
Shelled...bushels..	219	219.00	Rye...do....	118	885.00
Corn fodder...tons..	789	5,917.50	Wheat...do....	76	570.00
Hay, green:			Straw, rye...do....	20	150.00
Clover and orchard grass, tons...	96	720.00	Total...	...	9,461.50

Work of sewing and mending rooms during the year ended June 30, 1917.

ARTICLES MANUFACTURED.

Articles.	Quantity.	Value.	Articles.	Quantity.	Value.
Aprons:			Chemise...	1,371	$381.08
Boys' gingham...	18	$5.34	Cloths, table:		
Barber...	2	.40	Long...	290	906.40
Dining room...	156	28.02	Short...	205	389.37
White...	1 210	132.88	Coats:		
Gingham...	156	20.60	Citizens'...	670	702.20
Rubber...	9	6.03	Dairy...	36	25.92
Bags:			Overall...	966	824.73
Clothes...	11	2.58	Surgeons'...	1	.72
Jelly...	12	1.04	Covers:		
Bibs...	24	2.64	Billiard table...	1	3.75
Blouses...	441	1,058.40	Bookcase...	4	.72
Caps:			Bureau...	350	98.40
Dairy...	24	2.88	Car...	125	52.20
Rubber...	90	13.50	Couch, brown linen...	2	3.93
Cases, pillow...	5,033	756.01	Corset...	14	3.08
Linen...	8	2.24	Cushion, brown linen...	4	1.80
Rubber...	7	4.69	Piano...	1	.58
Silkaline...	1	.28	Screen...	267	45.39
Centerpieces...	1	.05	Screen, silkaline...	6	1.26

Work of sewing and mending rooms during the year ended June 30, 1917—Con.

ARTICLES MANUFACTURED—Continued.

Articles.	Quantity.	Value.
Covers—Continued.		
Sideboard	11	$5.72
Stand	874	227.24
Table, brown linen	8	10.24
Curtains:		
Sash, cotton	3	.48
Sash, Swiss	21	4.83
Swiss	28	34.44
For disrobing room	8	4.20
Window	1,004	722.88
Rubber	1	2.66
Brown linen	1	.94
Drawers:		
Boys' canton flannel	12	5.52
Canton flannel	3,731	2,224.82
Men's cotton	16	6.08
Women's cotton	1,010	240.48
Dresses:		
Denim	15	21.30
Gingham	1,550	1,634.38
Night, long	446	196.24
Night, short	943	301.76
Percale	415	500.20
Gowns:		
Nurses'	30	17.10
Surgeons'	7	5.01
Operating	3	3.48
Hose	1,637	153.99
Pants:		
Boys'	12	3.00
Citizens'	1,151	920.12
Dairy	60	43.80
Overalls	1,075	830.46
Soldiers'	603	1,386.90
Petticoats:		
Outing	3	$1.11
Petticoats	1,094	448.54
Sacques, dressing	2	1.58
Sheets:		
Double	156	92.04
Single	5,703	2,940.57
Shirts:		
Boys' canton flannel	12	5.52
Canton flannel	3,031	2,014.98
Check	3,002	1,222.60
Night	963	634.78
Shirtwaists, percale	2	.95
Shirts:		
Gingham	3	1.44
Denim	6	6.33
Strainers, linen	41	18.45
Suits, canvas	12	23.52
Ticks:		
Mattress, double	18	21.12
Mattress, single	528	484.68
Pillow	447	97.89
Towels:		
Barnsely	1,219	139.00
Bath	4,198	493.23
Tea	2,219	272.23
Tubs, canvas, bath	7	33.60
Underhandkerchiefs	1,213	121.30
Waists, boys' gingham	10	2.10
Total		24,064.94

REPAIRS AND MISCELLANEOUS WORK.

Aprons, made	277	$16.62	Rugs, bound	74	$4.44
Bags, laundry, made	179	7.16	Shirtwaists, made	2	.49
Blankets, hemmed	1,640	57.40	Suits cleaned and pressed	221	53.04
Drawers, made	17	2.72	Miscellaneous repairs	33,965	1,358.60
Dresses, made	8	7.60	Total		1,551.51
Gloves, made	341	13.64			
Names, sewed on	9,460	29.89			
Napkins, hemmed, patient labor.	1,296	.....			

Articles made in bakery during year ended June 30, 1917.

Articles.	Quantity.	Value.
Bread.....loaves..	1,002,208	$28,756.85
Rolls, single	2,371,936	13,686.77
Pastry.....pounds..	71,985	4,618.94
Total		47,062.56

Work done in laundry during year ended June 30, 1917.

Articles.	Quantity.	Value.
Pieces—		
Washed	3,633,221	$10,266.38
Dried	1,564,931	3,486.45
Mangled	2,068,290	2,586.89
Ironed	455,091	7,680.24
Total		24,019.96

Articles made in Howard Hall workroom during year ended June 30, 1917.

Brooms	1,152
Brooms, whisk	96
Hats, straw	144

Articles made in brush shop during year ended June 30, 1917.

Brushes:	
Blacking	240
Clothes	234
Hair	396
Scrub, deck	234
Scrub	444
Sweeping	34

Work done in mattress shop during year ended June 30, 1917.

Mats:	
Braided	31
Drawn	146
Mattresses made and made over:	
Hair, single	1,026
Hair, double	15
Straw	12
Pillows made and made over:	
Hair	955
Feather	2
Hair, old, renovated ---pounds--	24,175
Clothing repaired	115

Articles made in shoe shop during year ended June 30, 1917.

Shoes:	
Men's	84
Women's	12
Slippers, carpet	223

Canned fruits and vegetables, preserves, jellies, etc., prepared in hospital kitchens during year ended June 30, 1917.

	Quarts.
Apples, canned	42
Blackberries, canned	1,303
Catsup, bottles	1,600
Cherries, canned	370
Chili sauce	1,718
Beets, pickled	30
Beans, string	10
Jam, grape	580
Jelly:	
Apple	508
Blackberry	80
Currant	3
Grape	257
Grape juice	22
Peaches, canned	12
Pears:	
Canned	144
Preserved	785
Pickled	158
Pineapples, canned	26
Plums, preserved	298
Onions, pickled	283
Strawberries, preserved	56
Tomatoes:	
Preserved	52
Pickled	1,084
Watermelons:	
Pickled	28
Preserved	22
Mince meat---pounds--	1,890

Power, heat, and lighting plant.—The contracts for automatic stokers, coal and ash handling apparatus, soot blowers, and the rest of the equipment necessary to complete the remodeling of our power, heating, and lighting plant, centralizing our power plant and equipping this plant with the latest and most approved means of operation were entered into in June, 1915.

These contracts have now been completed and the installations accepted by the hospital. The automatic coal and ash handling machinery passed a satisfactory test and has now been in working order

during most of the past year. All the coal used is now conveyed to bunkers with a capacity of 300 tons and transmitted through hoppers for weighing into the fire boxes. The ashes are dropped into a pit, raked into a trench, and drawn by vacuum into an ash tank which stands outside the power house. From this tank they are conveyed to the ask dump. The services of only one man are required to rake all the ashes into the ash conveyor for approximately one hour each morning where formerly it took about one dozen men one-half a day. The relief afforded to employees and patients due to the substitution of mechanical conveyors for handling coal and ashes is considerable, and this is an especial advantage to patients who had the most laborious part of this work to do, often being compelled to do part at night and on Sundays.

The coal crusher has been regular in operation and reduces the lumps of coal on its way to the bunkers. The belt conveyor, while at first it seemed to have been too narrow and too much on an incline, has been overhauled and is working a good deal better. Iron guards have been placed inside of the ash pits in front of the boilers to prevent coal sifting into the pits. The bunkers when filled will hold enough coal to last approximately 72 hours.

Soot blowers.—The soot blowers have been applied to the 11 boilers and have now been in operation several months. It was necessary to make several changes from the original installation before these blowers gave final satisfaction.

Stokers.—The stokers were completed and put in place and subjected to two tests of their efficiency. These stokers at the second test reached the efficiency guaranteed in the contract. The analysis of the results obtained from the tests resulted in the information that it was not due to any fault of the stokers that the tests did not show better results, but the fact that it is impossible to achieve the rate of efficiency required in the specifications with the class of boilers in use in this institution. The contractors experimented with the boilers that we have in operation, and after conferring with engineers of the Bureau of Mines they decided that while it was possible to reach the state of efficiency with the class of boilers the specifications called for they considered that the best interests of the institution would require that changes should be made looking toward a greater efficiency with these boilers. The engineers of the Bureau of Mines in making their reports included therein a recommendation as to the purchase of certain additional baffling in order to change the boilers in such a manner as to get a greater amount of efficiency, which would result in more economical running of the plant. The baffling and other material necessary to make the change in one boiler has been ordered from the Heine Boiler Co., and as soon as this material is recieved one boiler will be changed and tried out and the results compared with our previous records to see if the change has caused the improvement which the Bureau of Mines' engineers believed could be made. These stokers have now been continually in operation for several months and have proven their worth. The amount of fuel consumed has shown a material reduction.

Steam meters.—The steam flow meters contracted for in June, 1915, have been applied to the 11 boilers and boiler feed lines. They were tested at the same time the stokers were tested, and were

found to be inaccurate and did not give results that could be used. The contractor was notified through the Interior Department, and his chief engineer and the vice president of the company visited the institution, went thoroughly over the work of installation, conferred with the engineers of the Bureau of Mines in addition to our own engineers and finally made a report that it was the unanimous opinion of the various engineers that it was impossible to manufacture meters that would comply with the specifications of the contract, guaranteeing an efficiency of 98 per cent. They further stated, and their statement was confirmed by the engineers of the Bureau of Mines, that the intent of the parties using meters of this sort was not so much to get the accurate amount of steam used by each boiler, but rather as a means of checking the performance of each boiler and getting the total amount of steam generated by the old plant, also the relative amount of steam used by any particular portion of the plant or industry connected therewith. They stated that the meters could do the work up to this standard in a satisfactory manner, and they guaranteed that it would continue to give this class of service which was in accordance with their contract. Upon the approval of their recommendation and statements as stated by the engineers of the Bureau of Mines these meters were accepted and are now in use.

Pumping station.—This plant has been entirely remodeled, the pumps and condensers having been replaced with new and more efficient and economical models, new floors and new frames put in throughout the place, painted inside and outside and generally overhauled. There is no comparison between the appearance of the plant now and what it was 12 years ago. At that time it was a very noisy place, shaking the building and the machinery, water dripping from the various pipe lines, coal dust everywhere, being worked under a continual strain night and day in order to get sufficient water from the wells to furnish the needs of the hospital. To-day the building has a concrete floor, is in clean condition, with newly painted walls and machinery, without a speck of dust or coal about, and not a sound is heard. No coal at all is used in this plant, it being electrically connected with the main power plant. We now have an abundance of water where formerly there was a scarcity. At present we have only 4 employees where formerly there were approximately 10, so in every way this change undoubtedly has been a great improvement for the institution.

In connection with the wells the air lines at the pumping station, which were overhead and have always given trouble in extreme cold weather on account of freezing, have been taken down and put under ground, in order to minimize or entirely eliminate trouble from this cause.

Coal storage.—We are at present remodeling and enlarging the coal pockets in connection with the power plant. These pockets are being enlarged and extended the full length of the power house. Three tracks will be placed over these pockets, two for the full length being over the soft-coal pockets and the third one, for the first half of the track over the soft-coal pocket, and for the further half over the hard-coal pocket. When these pockets are completed they will give us a capacity at track level of 6,804 tons of bituminous coal and 750 tons of anthracite coal. The track spoken of as the third

track, partly over the soft and partly over the hard coal pocket, is entirely completed and is now being used. The second track is practically completed and will be ready for use in a few days. The third track has merely been started and it will take some time before it is finally completed.

Railroad.—The roadbed has been overhauled the full length and new ties and ballast put in wherever they were needed. In many places it was found necessary to place new rails and make other repairs. Heavier rails have been purchased and whenever it is necessary to take out an old rail one of the new or heavier rails is put in place.

Locomotive.—The locomotive has been repaired. Complete new sets of tubes have been purchased not only for the new locomotive at present in use but for the old one, and it is hoped that we will be enabled this summer to retube both these locomotives. Having two ready for use we will be enabled to do some work and have one that might be used in case of emergency if it is necessary to lay up the other one for repairs.

Railroad scale.—The large railroad scale, used for weighing coal and other supplies received in carload lots, has been tested by the scale car, under the supervision of the Bureau of Standards, and in their report they state that the test showed that it comes within 0.17 per cent, which is in their passing regulation. At the same time they recommend that a new scale be purchased of a more modern and up-to-date style and one large enough to weigh the larger cars that are now in use by railroads for hauling coal.

Ice plant.—In the sundry civil bill enacted into law on July 1, making appropriations for the fiscal year ending June 30, 1917, there was an item for moving, enlarging, and remodeling the ice plant, and for the purchase of additional machinery, $19,000. Contracts were made with two companies for installing new machinery and moving the old plant. This work is now under way but has not as yet been completed. The old boiler house where the new plant is to be located has been entirely renovated. The old smokestack has been torn down to half its height, an elevator installed therein to raise the ice to the delivery wagons, and the interior entirely overhauled. The ice storage house has practically been completed; the tanks have been installed and are now waiting for cork covering. This work should be completed within a few weeks and it will then give us a materially increased capacity which should be sufficient to meet all our needs for some time. With the new machinery installed we will have a modern, up-to-date plant of sufficient size to furnish all the ice and refrigeration needed at the present time at a minimum of cost.

Elevators.—In the sundry civil bill there was also an item appropriating for electric elevators, $3,675. This was for two elevators, one for the kitchen building and one for the laundry building. The contractor for erecting the elevator in the kitchen building completed his work promptly and this elevator has been in operation under test for about four or five months, and has given entire satisfaction. It is fully equipped with the most approved safety devices. It is operated only from the floor outside the elevator, it being impossible for a person on the elevator proper to start it. It is surrounded

by lattice work with lattice safety doors, which can only be opened when the elevator is at the floor where the door is located.

The elevator for the laundry building, while practically completed, has not as yet been accepted, awaiting the furnishing of satisfactory locks on the doors, which are acceptable to the hospital under the contract. These locks must be of such a character that the elevator can not be started until the door is locked at the basement and the door can not be opened at each floor until the elevator is at place at the floor.

Fence.—In the same appropriation act there was contained an item for a new fence, amounting to $14,000. This item was to cover the cost of the fence to be erected along the east side of Nichols Avenue, extending up to and turning into Alabama Avenue or Hamilton Road. The contract has been awarded for furnishing the fence and gates. The same was to have been delivered during March of this year, but on account of the unusual conditions and failure of the steel companies to furnish the material in time there have been several delays. The gates and part of the fence have arrived and the balance of the fence has been shipped and is now on the way and should reach here within a few days. The forms have been made in which to erect the concrete posts upon which the gates are to hang, and as soon as the material is received here this work will at once be put under way. In the original appropriation act this appropriation would have expired at the end of the fiscal year 1917. The failure of the contractor to deliver the fence in time was explained in a letter to the Secretary of the Interior, who transmitted our explanation to Congress, and the life of the appropriation was extended until the end of the fiscal year 1918. The fence is what is known as an iron picket fence, the contractor to merely furnish the fence itself and the hospital to do the erecting. It is expected that the main portion of the labor will be that of patients. The erection of this fence will remove what has long been considered an eyesore around the institution grounds. There is at present standing some few parts of an old wooden picket fence of miserable appearance which is far better removed than in place. The erection of this fence will terminate an effort upon the part of the institution, extending over many years, to get a proper sort of fence surrounding this portion of the institution grounds. It will give the hospital more protection and permit of more privileges on the part of the patients, and we believe it can not but help being beneficial to the institution.

Shop and storehouse building.—In the same appropriation act there was also an item for shop and storehouse building—$24,755. It has been decided to erect this building just north of the Howard Hall grounds, the building running east and west and the store yard to extend back of Howard Hall building to the west. The plans have been drawn for this building and most of the structural iron and steel for the building and reinforcing steel and metal for the walls have been received. The sod has been removed and excavations started. The building will be two stories and basement in height, the basement being a storehouse for heavy material and a garage; the first floor will be the general storehouse, in which all material pertaining to the mechanical departments will be received; the second floor will contain the shops of the electricians, painters, and

tinners, amongst others. The construction will be of concrete and brick, with frame sashes.

Name of hospital.—In the same appropriation act there was an item which stated: "After the passage of this act the Government hospital shall be known and designated as Saint Elizabeths Hospital," so hereafter the hospital will be designated in such a manner that the word "insane" will not be included.

Cow barn.—When the new cow barns were completed there remained on the reservation to the east of Nichols Avenue two old cow barns, one in a very dilapidated condition, unfit for use, so that we were compelled to tear it down as soon as it was abandoned. The other was in condition that further use could be made of it if repaired. This cow barn is now being overhauled and renovated throughout. Asbestos, fireproof shingles have been substituted in place of the old roof; the side walls have been entirely gone over, the old wall boarding torn off and new put in place; the inside is being entirely changed and the big uprights, which made the place dark and gloomy, have been torn out and new, low stalls put in which will accommodate as many cattle but will completely change the appearance and make it lighter and more sanitary in every way. New floors have been laid throughout the building, new troughs put in wherever needed, and in general it is being thoroughly renovated and repaired. The outside of the building has been gone over very carefully and several coats of paint laid on. When completed this will fit in well with the new barns and add materially to the appearance of this portion of the reservation. The group of buildings used for our herd of cattle now consists of two new cow barns, the remodeled old cow barn, a smaller one used for the isolation of sick cows, one for housing the bulls and another with an operating room in which to treat the sick animals, and in addition the barn at Godding Croft for the calves. The work of remodeling these buildings and the surroundings is not altogether complete, as it will be necessary to rebuild some of the roads, fix up additional lockers, and make other small repairs of the same class.

Cows.—The regular tuberculin test of the cattle was made, the examination including 188 cows. There was one reaction; the cow reacting was condemned and sold. Upon killing it it was found that there were no lesions of tuberculosis, but instead this cow had a carcinoma of the kidney. This is about the seventh consecutive year in which the testing of our herd has found it to be absolutely without animals showing active traces of tuberculosis.

Milk.—During the past year we secured 147,022 gallons of milk from this herd, an increase of 600 gallons over the preceding year. During the past 10 years there has been an increase in the quantity of milk received of 50 per cent. The bacteriological test of various samples during the year developed that the class of milk being produced was of unusually high character, the milk giving only a few thousand bacteriological count and the pasteurized milk showing considerable decrease. The milk averages about 3½ per cent of butter fat.

During the past year we have had considerable trouble with an unnamed disease which has attacked our calves. We have lost 32 heifers, which died during the year, averaging from one to six

months. These heifers were mostly found dead in the stalls or in the pasture in the morning after appearing normal at the evening meal. The Bureau of Animal Industry has been unceasing in its efforts to identify the disease which has caused these deaths and has had three or four men working on it for over a year. Just as the year closed the bureau reported that this disease is caused by bacillus coli communis, and advised the injection of the calves with calf-scours serum which agglutinates with this bacillus. The hospital purchased some of this serum and the treatment recommended has been given. The bureau is now preparing bacterin, which will be ready within a week. This bacterin will be used for protective inoculation.

Hogs.—Considerable trouble has been encountered during the past year with the hogs. During this time we had a serious outbreak of hog cholera, which appeared about August, 1916, and continued well into December, in which time 37 pigs died of cholera. The entire herd has been injected with hog-cholera serum, and the new pigs as they appear are given this treatment. Lately the sows have seemed to be stronger and the progeny seem to be in a much better condition. During this year we killed hogs on several occasions from which we received 14,176 pounds of fresh pork.

Poultry.—The conditions in the poultry yard seem to have improved to some extent and during the past year there was produced 3,268 dozen of eggs and 283½ pounds of chicken. We have a larger number on hand than at the beginning of the year, and we expect to get larger results during the coming years.

Dining hall.—The building known as the dining hall, connected with the detached group of buildings, where approximately 500 patients eat, was, as explained in our last annual report, entirely remodeled. Continuing this work during the past year white metal tops have been placed on all the tables, the balance of the tables enameled and the chairs revarnished, thus vastly improving this room. Formerly, with its wooden floors, old walls, and wooden tables and chairs, it required scrubbing so often that there always remained an odor of damp wood. The remodeling has removed all this odor and now this room has a continual appearance of freshness, cleanliness, and is free from odors of any sort.

Industrial departments.—We are continuing our efforts to increase the work of the industrial departments of the institution and are gradually adding to the number of industries and increasing the number of patients that are put to work, which benefits both the patients and the institution. There has been a gradual increase in the number of patients being utilized in all branches of the service, in the new industries, in the laundry, on the farm and outlying departments, and particularly bodies of men that have been tried out under special attendants to look after the lawns and gardens.

Brush shop.—This department has been in continual operation during the past year and has practically made all the brushes in use in the institution. It is located in the basement under the large dining hall which is part of the detached group of buildings, being in the same room as the shoe manufacturing department, the mattress and rug shops, and the upholstery department. During the year 1,582 brushes of various classes were turned into the storeroom as

per detailed list in tabulated form in another part of this report. Many brushes of various kinds are in process of manufacture but are not included in the records until they are turned over to the storeroom. New material has been purchased in order to continue this work.

Mattress shop.—The growth of the institution has materially increased the work of the mattress shop. This department, located in the basement under the dining hall, makes all the mattresses and pillows that are needed in the institution, renovates the old hair after it has been used, makes over many mattresses and pillows, the total number during the past year being 1,053 mattresses and 957 pillows. A detailed statement of the work appears in another part of the report.

Upholstery.—The upholstery department is located in the same room as the mattress shop, and not only looks after the upholstery of all furniture of the institution, the making and hanging of all curtains, repairing and regulating of all clocks, but also is in charge of the chapel and amusement hall, as far as keeping both in proper shape for services and performances is concerned.

Shoe manufacturing.—This department is located in the basement under the dining hall and is a new industry, still in its infancy, which we believe gives promise of a useful future. During the past year the amount of work that could have been done by our patients was retarded to a great extent, due, first, to the fact that there was a delay in the installation of the machinery; second, it was necessary to teach the patients from the beginning; third, on account of the high price of raw material compared to the prices of the finished products on the supply schedule we were compelled, in order to keep within our appropriation, to buy the finished product as per contract and could not keep our men fully occupied in making new shoes and slippers. During the year the department completed and turned into the storeroom 96 pairs of shoes and 223 pairs of slippers. We believe this department will gradually be enlarged until within the course of a few years we will be enabled to make all the shoes and slippers needed in the institution.

Broom making.—The broom-making department is located in the basement of the Howard Hall department and in this place is manufactured all the brooms and whisk brooms needed in the institution. During the past year, as with other articles, the price of broom corn increased to such an extent that we were compelled to stop purchasing the same for several months and buy brooms from the general supply schedule contract. During the year we made 1,152 brooms and 96 whisk brooms. Part of the material from which these brooms were made was grown upon the hospital grounds. We have planted more broom-corn seed and hope to be able to raise larger quantities so that possibly some day we will be able to get sufficient from our own grounds to make all the brooms needed.

Hat making.—The hat-making department is located in the Howard Hall building. Here all the straw that comes about the tea chests is utilized by being braided into straw hats for the patients' use. During the year 144 straw hats were made, and this added to the number previously made in this department and which were on hand in the storeroom, was sufficient to furnish all those needed by patients working around the grounds.

Stocking making.—Additional machines were purchased for knitting stockings and hose and several patients have been instructed in their use. There have been 1,637 pairs turned into the storeroom, and this seems but a forerunner of a largely increased number which we will be able to have made by our patients.

Fruit and garden produce.—We have received quite a large quantity of fruit and garden produce from our farm, gardens, and orchard during the past year, not only sufficient for immediate uses, but from the extra supplies the kitchens were able to can several thousand quarts of fruit, put up about 600 bottles of catsup, the same quantity of chili sauce, and make many quarts of various kinds of preserves and pickles. These supplies were put aside for use during the winter months when it is difficult to get the fresh products, and proved to be quite an adjunct to the regular diet.

Marking supplies.—A marking machine has been purchased and installed in connection with the storeroom and laundry. This machine is used to mark all linen and stock supplies of the institution so that they may become easily identified and thus prevent loss or misappropriation.

Tailor shop and sewing room.—The tailor shop and sewing room practically manufactured all the bed linen, table linen, and household supplies needed in the institution, most of the female wearing apparel, and practically all the male wearing apparel. Additional machines have been purchased to replace old ones in order to keep this department up to its usual state of efficiency. This department has been gradually decreasing the number of its employees as these employees drop out or leave from any cause whatsoever by supplying their places by patients who are willing to help in this work.

Laundry.—The work in this department has continued to increase to such an extent that the total number of pieces laundered during the past year amounted to 3,633,385, approximately 119,335 pieces more than last year. In addition to this the hospital washed 171,936 towels for the Interior Department, for which we were reimbursed by that department out of their appropriations at the rate of 38 cents per hundred. A new flat-work ironer was purchased to be used as an auxiliary in order to accomplish the increased quantity of work of the class that these machines are used for. All the flat work has been done by patient labor, with the exception of sorting, during the past year. Some patients have been tried on the new machine, and so far good results have been obtained. The gas machines have continued to give us trouble, and we have finally decided that it would be wiser to exchange the machines that require gas to heat them for steam-heated machines that might be attached to our steam lines. This would not only do away with the necessity of having to generate gas for this use, but also with that of having naked flames in the building, and so minimize the danger from fire. The new machines, which have been ordered and will be delivered within a few days, will have the latest safety devices attached to them, so that the patients may be utilized in operating them in place of paid employees.

During the past year the electric chlorinator or bleaching machine which was purchased was installed, and we are now manufacturing all the bleach used in the laundry. This reduces materially the cost,

and we believe it has given even better results than the old chlorinated lime.

Libraries.—The libraries continue to grow, the increase in volumes in the medical library during the past year being 79, which makes a total of 4,020 volumes in this library. In the circulating library there was an increase of 744 new books, making a total of 7,096 books in this library. During the year there were 20,800 books drawn for reading, mostly by patients. There are about 200 books drawn each library day, and there are two library days each week.

Entertainments.—The entertainment of the patients during the season by means of moving pictures and dances in winter has continued as formerly; that is, a dance each Tuesday night, moving pictures each Wednesday afternoon and Friday night. The dances and shows were all well attended and apparently proved a source of much enjoyment. The afternoon concerts on the lawn in the summer months seem to have been a source of much pleasure.

Fire department.—On account of the illness of the former chief of this department, whose age and indisposition compelled him to be so often away from the institution, an acting chief was appointed to take complete charge of all apparatus and make an inspection of the institution to see that every part of the buildings and grounds was in a safe condition to minimize the possibility of a fire. In making this change a reorganization, as it were, was made of this department. New classes of drills were held and new apparatus purchased. Amongst other things a new hook and ladder truck has been purchased and provided for in the fire house. A reel was made to hold about 500 feet of fire hose and housed in the rear of building P, thus giving additional fire-fighting facilities to the Richardson group. Five hundred feet of additional fire hose has been ordered and about 70 fire extinguishers have been purchased.

A motor-driven siren was purchased and installed on the water tank, under the control of momentary contact push button in the telephone operators' room in building A, and a similar smaller siren installed in the power house for simultaneous signaling.

A valve-control key map was mounted in a metal box near the water tank, giving directions as to the proper arrangement of water valves to secure various combinations. This map is illuminated by two incandescent lamps which act as indicators to the presence of current in the switch-controlling siren. This is also a step in more efficient fire control and will permit the notification of various parties needed in case a fire should take place, and expedite the assembling of help to overcome the fire and look after any inmates wherever the fire should occur. New fire regulations are now being printed, and as soon as they have been completed will be sent around the various departments for the information of the various employees and patients.

Drinking fountains.—New drinking fountains have been purchased and set up in Richardson group, Howard Hall, and one near the building known as Oaks–A.

New boilers.—New boilers have been purchased and installed, one in the greenhouse and one in the pumping station, the one in the greenhouse to take the place of an old boiler, the estimate of repairs for which was more than the price of this new boiler. The

boiler purchased and used in the pumping station is to prevent the pipes from freezing during cold weather. A new boiler has been ordered to be located at Godding Croft. The one used there at the present time is entirely worn out, and, according to our mechanics, could not be repaired.

Oaks–B porch and hydrotherapy room.—The porch around Oaks–B Building has been inclosed, repainted, new steam lines installed, thus giving an additional capacity of 13 beds for the female department. Oaks–B hydrotherapy room has been remodeled, thoroughly overhauled, and repainted, the old floors taken out, and this hydrotherapeutic department put in first-class condition.

Power-factor meter.—A power-factor meter has been purchased and installed in connection with the electrical department to keep track of the generating of electricity.

Electric regulator.—An electric regulator has been purchased, and at present is ready to be put in place, which will automatically regulate the flow of current under different conditions of load and in this manner prevent the lights from flickering at every readjustment.

Portable hand-painted picture.—A second portable hand-painted picture has been installed in the chapel, backed with new lights and fixed up in such a manner so as to show the design in relief. This is the second picture of this class, both being received by the hospital from the same donor.

Detached buildings' improvements.—A new rat-proof baggage room has been provided in the basement under relief–4 to replace the damp and unsatisfactory baggage room beneath Allison–B. The roof of the dining hall has been repainted. The old sandstone steps at the west end of Atkins Hall have been replaced by new cement steps.

A large sewer pipe has been placed in the west end of Home Building, replacing a much smaller and unsatisfactory one, by reason of the fact that the smaller one frequently became stopped up, overflowing in home–1 ward.

New hoppers have been placed in Home Building. The elevator in the detached dining room has been repaired, and general repairs in the steam and plumbing work of this department have been completed.

West side department improvements.—The billiard and pool tables in the west side department have been overhauled and new balls and cues purchased. Linoleum has been purchased for Cherry ward, also new carpets for several of the wards in this department.

Tents.—Two new tents were purchased and placed in front of Oaks Building for the use of the patients during last summer. This enabled all the able-bodied patients of this section of the hospital to be out of doors during the pleasant weather.

Street washers.—New street washers have been placed in various portions of the grounds in order to keep the lawns in good condition, as otherwise when there is lack of rain they burn up and do not present a good appearance.

Food products.—On account of the extraordinary situation in this country, it becomes necessary to conserve our food, and the hospital decided that it was necessary to plant a greater area in an endeavor to get larger crops. Carrying out this idea, larger quantities of

seeds of various classes were purchased and places put under cultivation that heretofore had been used for lawns, playgrounds, etc. Among other places was the area in front of the administrative group, where a field of potatoes, taking in an area of one acre, has been planted and gives promise of a good crop. The old baseball field is at present being plowed, preliminary to planting wheat. After this field has been plowed, we will then begin to plow what is known as Prospect Hill for the same purpose. In this work quite an additional number of patients have been engaged. In the area between the greenhouses and Burrows Cottage, where formerly plants were raised, the space is now devoted to raising cabbage, and many barrels have been produced.

Burrows Cottage.—The occupant of what was known as Burrows Cottage, a building located north of the front center, died during the past year, and, under the agreement with the builders, this property now reverts to the United States for the use of the hospital. It is at the present time being entirely renovated, as it is necessary to do some repairing in the shape of carpenter work, steam and plumbing work. New rugs, linoleum, and furniture have been ordered. When the work is completed, it is thought desirable to use the building for housing night employees. Accommodations could be had for all the night female employees in the nurses' home, and this will make more room in this building for the additional help that we require.

Farm at Congress Heights.—Congress enacted a law authorizing the District Commissioners to broaden the street in Congress Heights in front of our farm. They authorized the taking of the necessary hospital land for this purpose. This involved the moving back of the fence and adding about 110 feet of our farm to the District streets. This continued practice has gradually taken away various portions of the farm land from the hospital for other uses. The next thing in this line that will probably happen will be authority given to a new railroad company that has permission to cross the Potomac River and have right of way through our Godding Croft farm, continuing on up the river and connecting with the Baltimore & Ohio Railroad at Shepherds Landing.

Red Cross.—Many of the patients are at work making articles for the Red Cross and similar societies, to be transmitted to the soldiers of this country and our allies. A cash collection was made from the employees of the institution, which amounted to $158.40. This sum will be transmitted this week to the Red Cross headquarters in the name of the St. Elizabeths Hospital employees.

Inspection.—The superintendent, in company with the steward and disbursing officer and his secretary and the person in charge of each department, made the tour of inspection of the institution, including all portions of the buildings and grounds, in the fall, winter, and spring months, taking note of any change suggested or improvement made and seeing that the buildings and grounds were in a thoroughly sanitary condition and kept in good shape in every way possible. While on these trips the superintendent speaks to any and all patients who might have anything to say to him in the matter of complaint or otherwise, and in that way is brought in personal contact with everyone on the reservation. A stenographer goes along on these

trips in order to make note of any suggestions that might be made or that might occur to them.

Roofs.—It is probably best that the hospital continue the practice of repairing the roofs and gutters of the main buildings that was started three years ago. None of this work has been done during the past year, due to the fact that the tinners have been busy upon the roofs of the cow barns, ice plant, and other similar construction. The roofs that will be required to have this sort of repairing done, including the taking out of the old gutters and putting in new ones, are Garfield, infirmary, Retreat–3, Dawes–3, and Spruce. In addition to this it will be necessary to replace the cornices and battlements on several of these buildings, and while making these changes it would probably be well to change from the present class to cement battlements similar to those that have been placed on the old Center Building.

Cost system.—The cost system introduced into the hospital during the past year has been carefully worked out and extended to take in many departments not previously included. The results obtained through this system of unit prices are gradually being perfected until we hope at some future date to get them very accurate. Of course, it will be impossible to get accurate results until the various meters, including the steam-flow meters purchased and which have just been accepted, have been working a sufficient length of time so that accurate comparisons may be made, and, further, until the system shall have been extended to every portion of the institution. This system will then be interesting from the relative standpoint and not from its commercial value. When I state relative standpoint I mean from a comparative standpoint, in order that a comparison may be made from month to month or from year to year or at various periods, and note changes. These changes will be subject to analysis in order that any differences may be explained. This will be the main advantage of having a system of this sort in a Government institution, the idea and advantage being that after a year or two has elapsed by comparing results from the various items or departments it will at once be possible to discern any material difference in cost, and the surrounding conditions should explain why these differences exist. It might be possible, for instance, on account of unusual conditions, that the cost should vary to a great extent, but in the absence of change of any of the conditions it would mean that an irregularity existed which needed investigation. In addition to the foregoing there will be something tangible before us. We will know exactly what it is costing us to produce various items and could employ our efforts either to substitute one thing of a greater value for an item of less value or less cost, or see in what manner the cost of producing any particular item might be reduced without decreasing its value. In working out this system during the past year many changes have been made. We found that in taking inventories wrong values had been placed upon some items, proper depreciation had not been noted, and the cost of some things had been charged to one department which should have properly been charged to another. Most prominent in connection with this might be considered the item of milk. Heretofore the cost of raising the calves has been charged to Godding Croft without giving that department any credit for the sale

of dry or unprofitable cows, young calves, or the production of milk. This is now changed, and Godding Croft is being credited with the cost of raising all the calves, based upon labor, prices, and produce.

Sun Dial.—Permission having been received from the Interior Department for the publication of a journal for circulation among the patients and employees, the proper staff was appointed and steps taken toward starting it. It was decided that the name of this periodical should be the Sun Dial. Articles were submitted, and two numbers have already been published and the third is now in press. We believe this will fill a long-felt want and prove to be a valuable means of communication between the staff officers, patients, and employees of the institution. It can not help but prove to be a benefit to the patients and an advantage to the hospital, it not only being an advantage from a material standpoint but interesting from the standpoint of the periodical itself. The numbers published have contained some very interesting and instructive articles.

Telephone.—The question having arisen as to the extension of the telephone system in the wards and physicians' quarters, this question was presented to the Comptroller of the Treasury for his opinion as to whether the appropriations of the hospital were available to pay for such services. The comptroller, in three separate opinions, decided that not only could they not be used for payment and extension of the telephone system but that the system, as already installed in the physicians' or employees' quarters could not be continued and the rental thereof paid out of the hospital appropriations. A deficiency estimate was made up based upon these opinions and transmitted to the House of Representatives for inclusion in the general deficiency act, which became a law in a special session of Congress upon the passage of the general deficiency act.

Automatic telephone.—A contract has been made with an automatic telephone company for the purchase of the material to install 20 branch telephones of what is known as automatic telephone apparatus. These 20 branches will be installed in the administration building, B and C buildings adjacent thereto. One branch will be placed in each office on the second floor of the administration building, and through this system communication may be had with the occupant of each of these rooms without the necessity of going through the hospital switchboard. This may be the forerunner of a general intrahospital service, with connections in every building, of a telephone system entirely owned by the Government, which should be of great economic value, as it would do away with the necessity of paying yearly rental for same. With this system in successful operation the hospital switchboard operators' labor would be materially reduced, their services being required primarily for city connection. There would be a branch of the automatic telephone in their office, which would enable them to answer all inquiries over the switchboard in reference to the condition of patients in the institution or transmit messages to any portion of the institution found necessary.

Fiduciary relations with the District of Columbia.—During the past fiscal year our bills to the District of Columbia for board for District indigent patients have been promptly settled. The amount estimated for in the regular District appropriation bill was not

sufficient to pay all our bills, and we called the attention of the officers of the District to this fact. They promptly asked for a deficiency of $40,000, and this sum, added to the original appropriation, was sufficient to pay our bills as they were rendered. During the past year our bills were rendered upon a basis of the exact cost of the board and maintenance of the patients, which we figure to be 70 cents per day or $255.50 per annum each. This, in accordance with the act of Congress of August 24, 1912, included the cost of repairs and roadways of the institution. It is quite difficult at the present time to state what the exact per capita cost for maintenance in this institution will be during the next fiscal year. The great increase in the cost of all supplies would preclude any safe estimate being made, even approximating the cost for 1918. We believe the best manner in which this could be handled is by continuing for the present the rendering of bills upon the basis of last year's cost, and when we have at hand records sufficient upon which the cost may be revised to at once change our bills to the new figures.

During the past year the average number of patients in this institution from the District of Columbia was 1,735, which was 32 more than the previous year. Most of this increase, however, was during the latter portion of the year. Based upon our previous experience we believe that the increase during the next year will be much greater from the District than during the past year. We arrive at this conclusion for several reasons; first, the population of the District is larger; second, there will be a large floating population in the District on account of the increased business occasioned by the war; third, the war conditions attract a large number of cranks to the Capital of the Nation, many of them whose residence can not be determined, and they will ultimately have to be cared for. From the foregoing we believe it safe to state that during the next fiscal year we must arrange for not less than a daily average of 1,850 patients from the District.

Financial office.—All vouchers presented to the financial office have been promptly settled. At the present time we are not able to determine just what balance will be left to the various appropriations after payment of all outstanding encumbrances, on account of the failure of several contractors to furnish supplies as ordered. These supplies, such as coal, food supplies, etc., if the totals ordered are not received, will leave a balance to the credit of the appropriation. All accounts of the disbursing officer have been promptly transmitted to the auditor through the chief clerk's office of the Department of the Interior. The accounts up to January 1 have been settled by the Auditor without any suspensions or disallowances. The accounts from January 1 to June 30, inclusive, have been transmitted to the auditor but no report has been received from these two accounts. Representatives from the Comptroller of the Treasury and the Auditor for the Interior Department visited the institution in September, 1916, and checked up the accounts of the disbursing officer. They stated they found everything correct and made a report accordingly, showing that all moneys received had been properly accounted for and the balance on hand agreed with the Treasury statements.

Account of House Committee of District of Columbia.—The House Committee of the District of Columbia which had been investigating the account of the St. Elizabeths Hospital and the District of Columbia for the board and medical treatment of patients admitted to this hospital on account of the District of Columbia, have called upon the institution for a statement containing lists of all so-called District of Columbia criminal patients either sent to the hospital directly or District criminals who were sent to penitentiaries, afterwards found to be insane and transferred to this institution during the past 10 years. The information they wanted in reference to these patients was, namely, the date they were received, time their stay in the institution expired, or if they were still in the institution. This information has not yet been furnished.

New supplies.—Additional rugs have been purchased to take the place of worn-out ones in the several offices, nurses' home, and wards. New furniture has been purchased for various parts of the institution. Rugs, linoleum, and furniture have been purchased for Burrows Cottage. New refrigerators have been purchased for various portions of the institution. Additional clocks have been purchased for various kitchens and wards.

Supplies.—The unusual conditions during the past year have seriously interfered with the securing of proper supplies. The conditions in reference to getting the proper class of supplies during the past few years have been difficult, on account of the gradual increased cost of the various items. The prices increased materially after the contractors put in their bids and they naturally wished to protect themselves as far as possible by reducing the amount of supplies furnished, upon which they claimed they were losing money. These conditions have been aggravated by the war, which has affected local conditions almost beyond belief. Many supplies could not be obtained at all and others were so scarce that it took a very long time before they could be delivered. Added to the conditions named it seems that matters were made even worse because of the poor crops during the past two seasons, which minimized to such a great extent the amount of food supplies on hand that it was impossible to secure some of the particular items that heretofore were thought to be essential for the needs of this institution. During the past year, for instance, we had trouble in securing—first, fuel; second, textiles, consisting of dry goods and wearing apparel; third, food supplies of various sorts, such as beans, navy and Lima; canned goods; fish and meats; fourth, drugs and chemicals; fifth, tools and metal material of all sorts; sixth, steam and engineering supplies; this also applies to tin and metal utensils for cooking and household purposes. Many of the factories formerly engaged in making these classes of supplies are now given over entirely to the manufacture of munition supplies and tools for munition makers.

The increased amount of work done by the factories in making munitions and similar products and the quantity of all classes of materials that have been exported to the countries engaged in war not only decreased the amount of available material left in this country but has caused even graver conditions to arise; that is, a decrease in the number of freight cars obtainable for local use so as to prevent the furnishing of supplies which otherwise would have been available

for use when needed. This has affected us most in the item of coal. While at the beginning of July, 1916, we had more than 5,000 tons of coal on hand, yet this supply was gradually reduced from the failure of the contractor to deliver coal as needed and ordered, until for several months we had barely enough to keep the plant running, and that only under conditions that we considered had reached their limit, namely, that of shutting off all heat, reducing the amount of light used to a minimum, curtailing the ice and refrigeration manufactured and taking other necessary steps to reduce the use of coal as far as possible. These steps were only taken as a last resort, weighing well each step before it was taken, the conclusion being reached that it was better to deprive ourselves of such things as heat, part light, and part refrigeration, rather than to use up all available coal and perhaps be in a position where we would have no heat, no light, no water or refrigeration and be utterly without protection night and day for any purpose whatsoever where fuel must be used and be at the mercy of a fire or any other catastrophe that might arise. This condition existed during the better portion of the year, and now, at the end of the fiscal year, we find that we have only a few hundred tons of coal on hand.

Textiles.—On account of the failure to get the textiles, as needed it was necessary for us to accept substitutes. The contractor who was furnishing the institution with jeans furnished only a small portion of the quantity that we generally use. To offset this we purchased some from another contractor of a better grade than is usually used in the hospital and substituted where it was possible. The contractor for furnishing sheeting and other textiles found it almost impossible to make deliveries. In consequence there was a continual shortage of all sorts of bed clothes and wearing apparel.

Food products.—It was necessary on account of the dearth of white potatoes to curtail their use to some extent and substitute other items. This same condition applied to white or navy beans. This difficulty was met by increasing the use of rice, hominy, hominy grits, corn meal, and macaroni. On account of the increased price of mackerel, salmon was substituted, and thus in many ways, by substituting for food products that proved to be scarce or unobtainable, others not so scarce we were able to overcome the shortage of food without hardship.

Medical supplies.—There were many items in the medical, surgical, and laboratory supplies that could not be obtained, but in every case the best available substitute was purchased, and we believe we were able to accomplish what was necessary in giving the patients the proper treatment. In reference to the other class of supplies spoken of there have been many delays and we still have many articles that have been ordered for several months but not as yet received.

Future work.—There is a good deal of work to be done in the near future for which it will be necessary to secure additional legislation before it can be entered upon, but there is some that we can do ourselves. On the last inspection of the institution by the executive officers, among the things noted that should be done and may be done by the hospital force were the following:

Hydrotherapeutic room.—Howard Hall has at present no hydrotherapy outfit for their colored patients, and it is highly desirable

to provide an outfit of this character. The physician in charge of this service recommends that a portion of the Dawes basement be set aside for this purpose. He has rearranged the patients in this basement and has set off a portion of the ward that could be readily adapted for this use.

Matron's linen department.—The steward again calls attention to the needs of a linen department. The best place for this would seem to be the old Center Lodge and old laundry buildings, which could be set aside for the linen department in connection with the matron's service. While at the present time this building is occupied, yet if other recommendations should be acted upon, it would be vacated and would be a good location, being close to the laundry, tailor shop, storeroom, and sewing room. Here the linen should be kept and all soiled linen and hospital laundry supplies received. The account at the laundry would be kept with the linen room and not with the wards. The account with the wards would be kept directly with the steward's department and only for new issues, and soiled supplies should be checked up by some one in the laundry in connection with the linen room and at once exchanged for clean supplies. This would obviate any account having to be kept between the wards and the linen department, and would remove all possibility of complaint of not receiving all the clothes from the laundry that were sent there. It would not affect the record if the names of the wards were washed out or torn from the clothes, and articles in such a condition that they could not be returned would be exchanged or replaced, and each ward be responsible for the actual number and quantity of supplies received and charged to each. The laundry in the same manner would be responsible for the total number of articles sent to that department and would have to account for just as many of each class of articles, and the loss would be at once noted and carelessness prevented if called to account.

On the lower floors of these buildings would probably be located some of the industries that it would be advisable to conduct. This is particularly pertinent at this time inasmuch as Congress has made an appropriation for a shop building. The shops such as the electrical and tin shop now located here will probably be moved during the coming year.

Auxiliary steam lines.—We should build an additional steam line known as an auxiliary high-pressure steam line connecting the power house with the kitchens. In the summer time steam can be turned on in this line in smaller quantities than in the winter when the steam is being used for heating the various buildings, and while this one line is being used the other line can be gone over by the steamfitters and the necessary repairs made. Most of the steam pipes for this purpose have been ordered and a contract has been made for two of the vacuum pumps which have been shipped, but as yet they have not reached the institution. We hope during the present year to begin the work of installation and to have a considerable part of it completed before next summer.

Arrangements should be made also to extend this steam line so as to take in Burrows Cottage and the various greenhouses. This would do away with the separate heating plants for these buildings, reduce the consumption of fuel, the cost of repairs, and the time of employees looking after them.

McIntosh & Seymour engine.—The cylinders in our McIntosh & Seymour engine need to be rebored, and it will be necessary to enter into a contract with the McIntosh & Seymour Corporation to have them send some of their mechanics to the hospital to do this work.

Retreat Building.—The patients in the Retreat Building are at the present time confined, being of a class that it is impossible to give parole, and requiring continual observation and careful attention. It would help matters if this building were reconstructed, the west end torn out and a porch built and properly screened, with a view of permitting these patients to have more air and ventilation. This would permit the patients to walk or sit out on this porch and have the benefit of pure air, and it would also make the ward more sanitary. The improvement, it is believed, would be a step toward improvement in treating this class of patients.

Tumbler for drying clothes.—As the amount of laundry work increases from year to year it will not be long before the capacity of our drying rooms will have been reached, and it would seem advisable, therefore, to purchase what is known as a tumbler machine to be used in connection with the drying of blankets and similar articles. When the blankets are dried in this class of machine it leaves them ready for use.

Sewer.—Many of the sewers of the institution will require overhauling and relaying. In some portions of the institution grounds it has been found that the sewers are higher than the drains. We have had considerable difficulty with the drain water from the detached group. This drainage water flows out through a catch basin in the corner of the wall adjacent to the north gate entrance from Nichols Avenue and empties into the ravine on the other side of the road. After a heavy rainfall the amount of water that passes through this drainage pipe is very great. In addition to this the District has an entrance to this pipe for the drainage water from Nichols Avenue. Complaint has been made by the owner of a garden along the course of this ravine that at the time when this water is increased after a heavy rain that it has been flooding her garden. Steps are being taken to install other drainage pipes to relieve this condition, and the District authorities have been notified so that they may cooperate and make the changes which will affect their system.

Roads.—New roads should be made around the various cow barns, one from the new cow barn to the pasture for the cows, then from the old cow barn under the same for the ensilage to be brought into the silos. The basement under the old cow barn should be concreted and the retaining walls cemented instead of bricked. The roadway from Nichols Avenue to the stable should be paved and the short offshoot from this road to the cow barn similarly paved. The road to the cemetery should be entirely overhauled and resurfaced. The road from the front center building leading down to the garden and pumping station is in bad condition, and this road needs thorough overhauling its full length. If Congress should give the hospital the necessary authority to take possession of the adjacent reclaimed land on the river front this road would be in continual use. Under present conditions the strain on the wagons going up and down is very destructive. To put this road in good shape for regular use it would be necessary to put in a good foundation with top dressing, going

over the same with 3 or 4 inches of trap rock and small screenings. While this will take some time, yet we believe it will be necessary to give it attention at the first opportunity.

Fence.—Congress having authorized the erection of a fence along Nichols Avenue and Hamilton Road, a contract having been entered into for this fence and most of it having been delivered, it will be only a short time before it will be erected. After this fence is erected it will hardly serve its purpose unless short additional fences should be connected therewith on the east and on the north end, from Nichols Avenue down the hill to prevent trespassers passing through the grounds and from Hamilton Road to keep out those who have no business on the reservation, and who make it a practice of passing through our farms and gardens, destroying property and helping themselves to supplies. A 6-foot high wire fence, similar to that placed about the detached group, I believe could be utilized for this purpose and should be considered during the next season.

Arrangements should be made for fixing individual lockers in the cow barns, where employees who milk the cows can hang their clothes when putting on the hospital uniform, so that conditions about this place may be kept neater and cleaner. It would be advisable to build a refrigerating plant in connection with the barns so that the milk may be chilled and kept there until it is distributed to the various kitchens and dining rooms.

New legislation.—The hospital at the present time has the greatest number of inmates it has ever had. The buildings are beginning to be crowded, and there are practically no vacancies for new admissions. The female department has few vacancies at this time; and the male department, outside of the criminal and tubercular wards, approximately no vacancies. Our admissions are increasing. We therefore must make arrangements to house a larger population. To do this it will be necessary to ask for legislation authorizing the construction of additional buildings. We already have a deficiency estimate before Congress asking that they appropriate $200,000 for the construction, equipment, and furnishing of such semipermanent buildings as may be required to provide additional accommodations for patients, this sum to remain available until expended. This legislation was requested on account of the war conditions which exist at present and to meet the influx which must take place from the increased size of the military forces of the country. If this institution must take care of all the insane from the enlarged Army and Navy, it will be necessary to build many additional buildings. The idea we have in view at the present time is to build these of a semipermanent character, as described in our estimates, to hold approximately from 30 to 40 patients each, more or less; to build them in as many different styles as necessary to meet the needs as they may arise; to group these buildings and build central kitchens and congregate dining rooms. This sum may only be a beginning and, in fact, as explained in a letter to Congress asking for legislation, it would be practically impossible to house all the patients that would be sent here upon the grounds now composing the institution, even if we had sufficient appropriations to build the buildings that could be placed thereon.

Transfer of patients to other institutions.—As explained under the preceding item, if Congress should authorize us to build up every portion of the land of which the hospital is at present composed, we would not have sufficient room to house all the patients that we would have to look after from the increased military and naval forces of the country; and we therefore thought it advisable to request Congress to pass legislation that would permit the transfer of military patients to all institutions of the country that would receive them under the same conditions as these patients are sent here—the Federal Government to pay for the care of these patients in the same manner as they care for the patients of this institution.

Reclaimed land.—In the matter of the reclaimed Anacostia Flats, lying along the river front of the hospital property, this land has been reclaimed by the engineers of the War Department and is valuable farming property. There is a considerable tract of it which would be of great use to the institution. The matter of permitting the hospital the use of these lands has been a matter of correspondence between the Interior Department and the War Department, which has supervision of this land, for some time. The net result, however, is that the hospital has not obtained use of the lands despite the fact that it is sorely in need of additional lands for farming purposes. In addition to this, each new building built by the hospital takes so much from the farm land. Thus it is that as additions are made to the institution more land should be added, so that the farm land should not be reduced. The other fact is that the War Department has leased this land to local farmers for a nominal sum, and they have succeeded in raising large and valuable crops of corn, which would have been of inestimable value for ensilage for our dairy herd, of which we do not have nearly enough. Inasmuch as we understood that the leases on these lands expired in December of this year, we considered that now was the proper time in which to have the authority for utilization of same transferred to the hospital. We therefore, when appearing before the House of Representatives subcommittee on deficiency appropriations, presented this matter and asked that the hospital be authorized to utilize this land. It was explained to them that whatever has been said as to our needs for this land heretofore, the need has vastly increased on account of the necessity of utilizing all available land of the present hospital site for additional buildings to care for future increases. It may become necessary to build additional buildings on this reclaimed land if the patients should be received in the institution in great numbers and facilities are not made for the transfer of some of them to other institutions. The importance of getting this land therefore can not be emphasized too greatly, and we trust Congress will recognize our needs and make the transfer as we have requested.

New cottages and kitchen, male service.—The construction of a new building for the male receiving service, turning over the present receiving building for use of the females would take care of an additional number of patients that we would have in the female department, but that would not add one additional bed to the male service, and this part of the question would have to be solved. Our experience with the five cottages erected to house the tubercular class of

patients has been very satisfactory. This class of building, while of cheap construction, yet seems to meet the needs of the class of patients which is occupying them. We believe a similar construction would be adequate for care of other classes of patients. I therefore believe that the best interests of the institution would be conserved by requesting of Congress that they make an appropriation of approximately $60,000 to erect and equip seven cottages on the order of those used as tubercular cottages, each to have a capacity of 20 patients, together with a central kitchen, to be located on the plot of ground in front of the building P or elsewhere about the institution as shall be determined.

Employees' quarters.—At the present time we are unable to supply the necessary room for all classes of employees that it is desirable to have reside upon the reservation. In connection with this it might be well to call attention to the fact that while we have nurses' homes for both male and female nurses and attendants under the supervision of a housekeeper, the laundry help are under only limited supervision, and that class of help which would probably need supervision more than the others spoken of, that is, the kitchen, domestic, farm, and mechanical employees, are without adequate supervision. It would be necessary either to provide additional room for this class of help or change the contract offering employment so as to omit the supplying of quarters. At the present time we must refuse to furnish additional rooms to some of this class of help, and as the limit of the pay is quite small without their quarters it is difficult at some times to get the proper class of help.

Staff quarters.—Additional quarters should be provided for the hospital staff. At the present time they are quartered on the second floor of the Administration Building and in various other parts of the institution. The office part of the Administration Building is at present crowded for room, and it will not be long before it will be necessary to provide additional rooms for the various offices. The growth of the hospital has been so rapid of late that the increase in the number of patients together with the number of records required takes a great deal more space for administrative purposes. We find it continually necessary to add to the records and histories we take of our patients. All this requires more room. Our record room is beginning to get crowded and the other offices have no vacant space to take care of additional demands in the future. In line with this it will soon be necessary, in seeking additional room, to go to the second floor of the Administration Building now being used by staff officers for their residences. Therefore, it is recommended that appropriation be secured to procure staff quarters to house these officers so that the room they abandon may be used for administrative purposes.

Gate house.—I again call attention to the essential need of a new gate house. We have a new entrance, the roadway has been cut through and completed, and only the new gate house and gates are needed. The hospital has many visitors, relatives, and friends of patients, in addition to sightseers, and some accommodation should be provided not only as a convenience while waiting for a car, but also in the way of protection from the weather and as a public convenience station.

Bulletin.—It is desirable that Congress authorize the publication of a bulletin which shall contain the most important results of scientific work carried on in this hospital. Such a bulletin was printed by the department for some five years. Widespread interest was taken in it, and frequent requests were and still are received for it. This implied that it was greatly appreciated by other institutions of like character throughout the United States. The existing law (sundry civil act of Mar. 3, 1915, 38 Stat., 382) "prohibits the use of any part of the moneys therein appropriated for printing and binding except such as shall be certified in writing to the Public Printer by the respective heads or chiefs thereof to be necessary to the conduct of the ordinary and routine business as required by law." This paragraph makes legislation necessary for this apportionment. It would seem advisable, therefore, to suggest that the following be included in the next appropriation act: "Authority is granted for the publication of an annual bulletin of the results of scientific investigation by the medical staff of the hospital, the cost thereof to be charged to the appropriation for public printing and binding, Department of the Interior." I think this provision highly desirable, because a great amount of scientific work is done at this hospital which is necessarily scattered throughout the literature, a large portion of which never comes to the notice of those for whom it would be most valuable. By collecting it in the form of bulletins it is brought to the immediate attention of hospitals engaged in similar work, many of whom are backward in scientific development and need the stimulus and help supplied by such means.

Admission to the hospital.—We would suggest that an attempt be made to secure additional legislation, first, looking toward voluntary admission to the hospital, and, second, changing the method of committing those to the hospital who it is necessary to send here. In the absence of a municipal hospital with a psychopathic pavilion in this city we believe the best interests of the citizens thereof would be conserved by having legislation enacted whereby those who may find themselves suffering from nervous or mental trouble could voluntarily come to this institution and request that they should be treated in the same manner that they may enter any municipal hospital for treatment of any sort. In this manner many would avail themselves of this opportunity at the beginning of a nervous or mental breakdown, and would thereby secure treatment at a sufficiently early stage to prevent a total breakdown and by careful attention many whose lives are now lost on account of delay might be saved. We believe that the percentages of recoveries would increase quite materially. This legislation might provide that where persons voluntarily enter the institution and put themselves in way for treatment that they must be released within a certain time, to be decided upon, such as three, five, or more days, when they request it. In the meantime if the superintendent or the party in charge of said institution should consider that the patient is in need of additional treatment, and that if permitted to go free he may become a menace to himself or to the community, they could call the attention of the corporation counsel to the fact, so that he might be placed under observation or at once taken charge of by the city authorities and through the proper channels committed to the institution for care and treatment. Instead of the present manner of sending all here

by requiring that they be tried before a jury of laymen in the same manner as criminals, it would seem desirable that all this form of procedure be omitted except in such cases as requested by the patients themselves or their relatives or friends on their behalf. This would do away with the necessity of compelling a class of patients about whose condition there is no doubt, unless they themselves desire it, from being compelled to appear in court before a jury subjected to the humiliation of having their infirmity made public. If these laws were enacted, it would undoubtedly be for the best interests not not only of those who are afflicted, their relatives and friends, but of the public as a whole.

Population.—During the past year there have been admitted to the hospital a total of 898 patients, which is the largest number of admissions since the hospital was built, 83 more admissions than the previous year, which was the largest year up to that time. On July 1, 1916, there were 3,193 patients and on June 30, 1917, 3,244 patients, an increase of 51 over the past year. The average number of patients under treatment for the year ending June 30, 1916, was 3,123, and for the year ending June 30, 1917, 3,209, showing an increase in the daily average for the year of 86. It would seem from the foregoing that it is safe to state that our average during the year 1918 will be considerably greater than for the past year and our average for the year ending June 30, 1919, will undoubtedly show a considerable increase over the present number. While the average during the past year was 3,209, yet we are beginning this year with 3,244 patients, only 35 more than our daily average for last year. Under ordinary conditions we believe it will be safe to figure on a daily average of 3,500 patients for next year. Of these we would expect about 1,850 from the District of Columbia and 1,650 from other sources, but these are not ordinary times, in fact they are extraordinary times, and there is no safe method in estimating for the next year the number of patients that this institution must care for. It undoubtedly would be safe to estimate that the minimum number to be taken care of from the District itself would be 1,850; the increased number from the Army of the United States, with a gross total of one million men, estimating on only two per thousand, would be 2,000; from the Navy, estimating at the same rate, would be 500; from the Marine Corps, Public Health Service, criminals, and other sources, not less than 100. The daily average of these classes of patients during the past year was 1,474. Recapitulating, we have—

Daily average of District patients	1,850
Daily average the past year from other sources	1,474
New patients:	
Army	2,000
Navy	500
From other sources	100
Total	5,924

Of course there may be many of these patients discharged before others are admitted but at the minimum we will undoubtedly have not less than a daily average of 5,000 patients to take care of in this institution, unless provision is made for transferring them to other hospitals. These figures must be based on normal conditions, but the present is not a normal state of affairs. We are in the midst of a world war. Extraordinary conditions prevail and only the merest

guess can be hazarded. All of these numbers we have a right to expect will be materially increased by the actual conditions of war. The number of insane to be cared for here would then largely depend upon the policy of the War Department as to sending the sick back home across the ocean. If they were kept over seas the problem would then be only somewhat delayed until after the war.

In view of the foregoing I think the only safe thing to do is to estimate upon a basis of normal conditions; that is, 3,500 patients, 1,850 of whom are to be from the District of Columbia and 1,650 from other sources, for which an appropriation must be asked from Congress. If the population exceeds this number we could then present the matter in a deficiency estimate to Congress and ask for additional appropriations to cover any excess that might be necessary. Based upon the population of 3,500, of which we must ask an appropriation for 1,650 direct from Congress in the sundry civil bill, it would seem that we would require $486,500. This estimate is based upon 1,650 patients at $220 per annum, the same per capita as has heretofore been authorized by Congress, making a total of $363,000. Add to this $100,000 to put into operation the eight-hour law on the wards and other portions of the service makes a total of $463,000. Add to this, as a conservative amount, on account of the increased cost, due to the high cost of living, five per cent, or $23,500, making a grand total of $486,500.

It will be difficult at the present time to estimate on what will be needed to pay other institutions for the board and maintenance of patients transferred from this hospital under the order of the Secretary of War, should legislation authorizing such transfer be enacted, and inasmuch as Congress might authorize the War Department to pay directly for the board and maintenance of that class of patients, we hardly deem it advisable to make estimate to cover the cost.

Pay-roll changes.—There are certain increases of pay in the various divisions of the hospital which would seem to be desirable. The cost of living has increased during the past few years to a great extent. Labor of all kinds seems to be in great demand, and it is getting more and more difficult to secure employees. The increase in appropriation that is requested of Congress, in order to provide for the employment of ward and other employees under the eight-hour law, provides than an allowance be made to employees not living in the instition, inasmuch as it would be impossible to accommodate all employees with the eight-hour law in effect in the building we have here.

I therefore think it advisable that Congress be asked to authorize payment increases from the amounts paid during the past fiscal year to that in the line of salaries estimated for for the fiscal year ending June 30, 1919, together with an allowance for board and lodging of those who do not live in the hospital, these increases to be made from current lump-sum appropriations as included in the totals estimated for.

MEDICAL DEPARTMENT.

Training school.—The entrance examinations were held October 6, 1916. Eighty-seven attendants entered the examination, 63 of whom passed and were admitted to the junior class. Six have resigned

during the year, 9 have been discharged, and 7 failed in their examinations, leaving 41 who have been promoted to the senior class.

The senior class consisted at the beginning of the term of 42 members. Four of these resigned, 8 were discharged, and 2 failed in their final examinations. The graduating exercises were held in Hitchcock Hall on the evening of June 21, 1917, 28 members of the senior class receiving diplomas. During the year the juniors received 28 lectures, 24 hours' recitation, and 24 hours' demonstration in addition to the practical work on the wards which, of course, continues through the year. The seniors received 32 lectures, 32 hours' recitation, and 26 hours' demonstration. A special course in dietetics was given to the senior class by Mr. D. J. Sullivan, chef. Each member of the class received eight hours' instruction. Tuesday and Friday mornings special demonstrations are held in the operating room. These include preparation of instruments, dressings, solutions, etc. Six members of the senior class receive these instructions for six weeks at a time. Twenty major operations have been performed, and all the minor surgery cared for. A number of fractures have been reduced and plaster casts applied. Fifty-six doses of salvarsan have been administered in the operating room. In addition to this, preparation for its administration on different wards is made on an average of twice a week.

Staff conferences.—During the year 1,061 cases were presented to conference for consideration. Five hundred and thirty-eight of these shown below were presented for the first time, 528 having been previously presented:

	Male.	Female.	Total.
Discharge	282	97	379
Visit	128	78	206
Parole	201	2	203
Diagnosis	160	7	167
Opinion	83	23	106
Total	854	207	1,061
Second presentation	232	45	277
Third presentation	123	26	149
Fourth presentation	41	6	47
Fifth presentation	21	4	25
Sixth presentation	8	.....	8
Seventh presentation	4	.....	4
Eighth presentation	1	.....	1
Ninth presentation	1	.....	1
Other presentations (twenty-second to thirty-third)	12	.....	12
Total	443	81	524
First presentation	411	126	537

Contagious diseases.—During the year July 1, 1916, to June 30, 1917, the following cases of contagious diseases were reported:

Measles, four white male employees; two white female employees.

Varicella, one white male patient; one white male employee; two white female employees.

Scarlet fever, three white male patients. One white male patient was isolated as a suspected case of scarlet fever (desquamation).

Mumps, 13 white male patients; 12 white male employees; 1 white female employee.

Physical diseases, July 1, 1916, to June 30, 1917.

	Male.				Female.				Total.
	White.		Colored.		White.		Colored.		
	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	
General diseases.									
Adenitis, tubercular							1		1
Carcinoma:									
Breast					4				4
Gall bladder			1						1
Liver	2								2
Stomach					1				1
Throat					1				1
Uterus					1		1		2
Diabetes mellitus	2		1						3
Epithelioma	3								3
Erysipelas	11		1		1		1		14
Goiter, exophthalmic					1				1
Gonorrhea	2								2
Influenza	66	28			34		12		140
Malaria	19	5	2		8	4	5		43
Measles	1	7				2			10
Myalgia	8								8
Parotitis	13	12				1			26
Purpura, rheumatica						1			1
Rheumatic fever:									
Acute	7	1	3		4	1	4		20
Chronic	17		8		16	2	3		46
Scarlet fever	3								3
Sinuitis		1							1
Syncope					2				2
Syphilis	17		22		6		14		59
Tuberculosis:									
Miliary	1								1
Pulmonary	4	2	4		1	1	2		14
Varicella	1	1				2			4
Diseases of nervous system and organs of special sense.									
Blepharitis	1				2				3
Cerebral hemorrhage	3	1	1		8		8		21
Cerumen impacted	1								1
Chalazion					1				1
Conjunctivitis:									
Acute	18	2	4		8		5		37
Chronic	3								3
Purulent					1				1
Epilepsy	3				2				5
Glaucoma, acute hemorrhagic	1								1
Globus, hystericus						1			1
Hemorrhage, conjunctival	1		1		1	1			4
Herpes zoster	2				2	1			5
Hordeolum	2				4	1	2		9
Iritis	1								1
Keratitis	1								1
Migraine	7				6	2	1		16
Neuralgia	1				6				7
Neuritis	1				8		2		11
Multiple							1		1
Otitis:									
Externa			1						1
Media	6	1	2		5	5	3		22
Paresis	12				1	1			14
Scleral hemorrhage			2						2
Sclerosis, disseminated		1							1
Status epilepticus	2				1				3
Tabes dorsalis			1						1
Torticollis					1		1		2
Diseases of circulatory system.									
Aneurism, aortic	1		1						2
Aortic stenosis	1								1
Arteriosclerosis			1				5		6
Cardiac decompensation	1	1	1		1		1		5
Cardiac dilatation					3		1		4
Cardiovascular disease	9		5						14

Physical diseases, July 1, 1916, to June 30, 1917—Continued.

	Male.				Female.				Total.
	White.		Colored.		White.		Colored.		
	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	
Diseases of circulatory system—Con.									
Endocarditis:									
Acute	8				6		13		27
Chronic					2				2
Epistaxis	1								1
Gangrene, arteriosclerotic					1		1		2
Hemorrhoids	7	3	10		6		3		29
Lymphadenitis	1		1			1	1		4
Mitral insufficiency	3		3		6		3		15
Myocarditis	6	7			8		4		25
Pericarditis							1		1
Varicose veins	1				1				2
Diseases of respiratory system.									
Abscess, pulmonary		2							2
Asthma			3		1		1		5
Bronchitis:									
Acute	63	34	24		54	2	16		193
Chronic	6		12		7		1		26
Coryza					1				1
Empyema	1								1
Gangrene, pulmonary			1						1
Laryngitis	4	1			8				13
Ozena	1								1
Pleurisy	2	1							3
With effusion	1								1
Pneumonia:									
Bronchial	11				3				14
Lobar	7	6	2		10	1			26
Pulmonary hypostatic congestion	1		1						2
Rhinitis	45	13	15		75		10		158
Ulcer, nasal							1		1
Diseases of digestive system.									
Abscess:									
Alveolar	1								1
Peritonsillar						1			1
Appendicitis:									
Acute	1	2							3
Chronic	1								1
Carcinoma					2				2
Cholecystitis	2				9		1		12
Cholelithiasis					1				1
Colitis	1	2							3
Enteritis	8	1	8		53	4	8		82
Enterocolitis	23	2	7		1				33
Fecal impaction			1						1
Gastric ulcer			1						1
Gastritis:									
Acute	6	2	4		6	1	1		20
Chronic	1								1
Gastro-enteritis	7	4	5		1				17
Gingivitis	5		1						6
Hernia	1				1				2
Abdominal						1			1
Inguinal	1	2			2				5
Suprapubic					1				1
Hyperchlorhydia	2								2
Intestinal obstruction	1								1
Pharyngitis	19	9	9		20	3	3	1	64
Stomatitis	4	3	3		1				11
Tonsillitis	27	19			28	18	22		114
Ulcer:									
Duodenal (perforating)	1								1
Tooth	1		1						2
Nonvenereal diseases of genito-urinary system and adnexia.									
Albuminaria					1		4	1	6
Cystitis	6		2		1		1		10

Physical diseases, July 1, 1916, to June 30, 1917—Continued.

	Male.				Female.				Total.
	White.		Colored.		White.		Colored.		
	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	
Nonvenereal diseases of genito-urinary system and adnexia—Continued.									
Dysmenorrhea					5		1	1	7
Gangrene, penis and bladder	1								1
Menorrhagia					1	1			2
Miscarriage						1			1
Nephritis:									
Acute	2		3		6		3		14
Chronic	17	2	19		25	1	20		84
Orchitis	1		1						2
Salpingitis					1				1
Urethritis			1						1
Uterine fibroma						2			2
Diseases of cellular tissue.									
Abscess	67	14	15		22	6	10		134
Adenitis, cervical	1								1
Bursitis	1								1
Cellulitis	9	1	3						13
Chancroid			1						1
Cyst	1								1
Decubitis			4						4
Dermatitis			3		10		1		14
Medicamentosa						1			1
Venenata					1	1	1		3
Eczema	16	1	4		4	1	1		27
Erythema multiforme					1				1
Furunculosis	34	2	2		1		1		40
Gangrene							1		1
Herpes	4				5				9
Ichthyosis			1						1
Impetigo		2	1						3
Ingrown nail	4		3						7
Malaria	1		2						3
Paronychia	1				10				11
Pediculosis	5								5
Psoriasis	2				1				3
Tinea			1		1				2
Circinata			1			1			2
Tonsurans	4		8						12
Urticaria	1		1		5				7
Diseases of bones and organs of locomotion.									
Myalgia	1		1		3		1		6
Talipes planus						2			2
Affections due to external causes.									
Burns	20	1	11	1	13	1	9		56
Decubitus			8		3		1		12
Dislocation:									
Mandible			1						1
Shoulder			1		1				2
Fracture:									
Clavicle	2				1				3
Femur	3		2		4				9
Fibula	1								1
Humerus	1				1				2
Malar	2								2
Metacarpal	4	1							5
Nasal	3								3
Os calcis	1								1
Phalanx	2				1				3
Radius	1							1	2
Rib	2		2						4
Scapula		1							1
Tibia	1	1							2

Physical diseases, July 1, 1916, to June 30, 1917—Continued.

	Male.				Female.				Total.
	White.		Colored.		White.		Colored.		
	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	
Affections due to external causes—Continued.									
Frost bite	1		1						2
Pneumothorax	1								1
Sprains:									
Ankle	6	2	2		2		2		14
Elbow			2						2
Hip	1				1		1		3
Knee	1		3						4
Phalanx					1				1
Shoulder			1		3				4
Spine	1				1				2
Wrist		1	2				1		4
Suicide	1								1
Wounds:									
Abraded			1				1		2
Contused	163	16	30		94	2	29		334
Incised	27	2		1	30	2	18		80
Infected	22	2	20		48	3	15		110
Lacerated	222	26	78	2	21	1	10		360
Total	1,205	245	422	4	785	84	296	4	3,045
Minor operations.									
Excision, nail		1			1	1			3
Incision, drainage	42	2	16		14	3	2		79
Injection:									
Arsenobenzol	1		4						5
Mercurial	448		138		1				587
Salvarsan	39		6		39		26		110
Intraspinous injection	19								19
Lumbar puncture	191		22		21	1	11		246
Paracentitis, abdominal	8								8
Suturing of wounds	29	2	18		23		6		78
Tenotomy					1		1		2
Veni puncture	237		13						250
X-ray photograph	2				2				4
Total	1,016	5	217		102	5	46		1,391

Clinical report, 1916–17.

	Male.				Female.				Total.
	White.		Colored.		White.		Colored.		
	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	
DEATHS.									
Adenitis, tuberculous							1		1
Alcoholism	1								1
Aortic insufficiency	2		1						3
Arteriosclerosis, cerebral	2		1		1		2		6
Bronchitis, chronic					2				2
Carcinoma:									
Breast					2				2
Cervix					1				1
Duodenum	1								1
Kidney	1								1
Esophagus					1				1
Stomach	1				1				2
Uterus					1				1
Cardiac decompensation	1		1		1				3
Cardiovascular disease	8		2		9				19
Cerebral concussion			1						1
Cerebral hemorrhage	7		2		8		5		22
Cerebral softening					1				1
Cerebral syphilis			2				1		3
Cerebral tumor	1								1
Cholecystitis					1				1
Chorea, Huntington's					1				1
Cirrhosis, liver	2		1						3
Cystitis	1				1				2
Diabetes	1		1						2
Endocarditis, chronic	6		1		9		3		19
Enteritis, acute					1				2
Entero-colitis	4		2						6
Epilepsy, traumatic	2								2
Epithelioma, face	1								1
Erysipelas	2								2
Exhaustion, senile					2				2
Gangrene, arterio-sclerotic							1		1
Gangrene and sepsis	1								1
Gangrene, pulmonary							2		2
Gastro-enteritis	1								1
Malaria							1		1
Mitral insufficiency	2								2
Mitral stenosis	1		1						2
Multiple sclerosis			1						1
Myocarditis	61		17						78
Narcosis, ether							1		1
Nephritis:									
Chronic	22		10		2				34
Multiple					1				1
Organic brain disease	1				2		1		4
Paresis	41		13		6		4		64
Pericarditis, chronic	1								1
Peritonitis	1								1
Pleurisy, purulent			1						1
Pneumonia:									
Bronchial	11				3		1		15
Hypostatic	3		1						4
Lobar	7		3		2				12
Polyneuritis					1				1
Polyneuritis with exhaustion					1				1
Pulmonary abscess					1				1
Pulmonary gangrene	2								2
Pulmonary hypostatic congestion	4		3						7
Rupture, heart	1								1
Septicemia	1		1						2
Status epilepticus	1		4		3		3		11
Strangulation			1						1
Suffocation, accidental			1						1
Suicide, fracture cervical vertebra	1								1
Tuberculosis:									
Miliary	5								5
Pulmonary	45	1	5		3		3		57
Ulcer:									
Duodenal	1								1
Gastric	1								1
Total	260	1	77		68		29		435

Operations.—The following surgical operations were performed by the consulting staff:

Major operations performed by the consulting staff.

Abscess, pulmonary	1
Amputation, gangrene leg	1
Appendectomy	4
Carcinoma, breast	3
Cystotomy, suprapubic	1
Excision:	
Cyst, breast	1
Glands, cervical, suppurating	2
Glands, inguinal	1
Fracture:	
Clavicle, cast applied	1
Femur, cast applied	2
Humerus	1
Herniotomy	1
Inguinal	2
Hysterctomy	1
Laparotomy, resection gangrenous intestine	1
Otitis media	1
Tenotomy, flexor muscles, hand	1
Urethrotomy	1
Total	26

The operations were performed by the following consulting surgeons:

Dr. W. B. Butler	1
Dr. J. Mitchell	1
Dr. Louis Taylor	6
Dr. G. T. Vaughan	6
Dr. C. White	8
Dr. Adam Kemble	2
Dr. T. E. Neill	1
Total	25

One operation for extirpation of carcinoma of breast was performed by Dr. W. M. Sprigg upon patient at request of her relatives.

Work of the hydrotherapeutic department.

	Male.		Female.		Total.
	White.	Colored.	White.	Colored.	
Average number of patients treated per month	141.2	.....	67.2	58.3	266.8
Average number of treatments per month	2,771.2	.....	2,467.9	2,110.5	6,849.7
Total treatments given	27,255	.....	29,615	25,327	82,197

Work of the field officer.

Visits made:	
Female, white	13
Female, colored	22
Male, white	1
Total	36

Dr. A. D. Weakley, in charge of the dental department, submits the following report of work done during the year:

Work of dental department during year ended June 30, 1917.

Extractions	781
Treatments	490
Fillings	575
Cleanings	177
Artificial dentures:	
New	24
Repaired	30
Total number of patients treated	1,350

Dr. A. Jacobs is now on duty as dental interne, being the second appointment within the year, Dr. Neal Harper having resigned and Dr. W. G. Dougherty having been ordered to Army duty with the Massachusetts troops.

Dr. Arthur H. Kimball, in charge of the eye, ear, nose, and throat department, submits the following report of the work done during the year:

Work of the eye, ear, nose, and throat department during the year ended June 30, 1917.

Number of visits		52
Number of patients		528
Male, white	321	
Female, white	134	
Male, colored	26	
Female, colored	31	
Japanese	1	
Filipino	1	
Employees	14	
Total		528
Examinations and treatments:		
Eye—		
Refraction	279	
Other eye conditions	152	
Nose and throat	51	
Ear	46	
Total		528
Operations:		
Major		1
Minor		7

REPORT OF THE CLINICAL PSYCHIATRIST.

This report does not include July, August, and September, 1916, work having been suspended because of other duties.

Cases studied with junior physicians:	
Alcoholism, chronic	4
Alcoholic hallucinosis	2
Arteriosclerotic dementia	24
Cerebrospinal syphilis	3
Dementia precox types	120
Infection-exhaustion psychosis	3
Manic-depressive types	38
Mental defectives	25
Paranoid types	30
Paresis	29
Psychopathic personalities	3
Prison psychosis	4

Cases studied with junior physicians—Continued.	
Psychosis associated with epilepsy	5
Senile dementia	9
Traumatic psychosis	2
Undifferentiated psychosis	1
Not insane	2
Total	304
Cases given special psychotherapeutic attention:	
Dementia precox types	57
Manic-depressive type	16
Obsessive craving	1
Paranoid types	1
Total	75

REPORT OF ASSISTANT CLINICAL PSYCHIATRIST.

Alcoholic psychosis (?)	1
Anxiety state	2
Dementia præcox types	28
Depressive types	5
Intoxication psychosis	1
Manic-depressive types	39
Paranoid state	11
Psychoneurosis	2
Total	91

SCIENTIFIC DEPARTMENT.

Personnel.—Dr. K. S. Lashley was employed as assistant in the psychological laboratory for a period of three months.

Dr. J. A. F. Pfeiffer, on account of illness, has not been able to carry on his work since March 15, 1917.

Photographic department.—During the year there were made 797 plates and 863 prints of patients for the general records, 37 plates and 47 prints for the administrative department, 1 plate and 2 prints for the scientific department, and 18 prints of X-ray plates for the records.

Pathological laboratory.—On account of there being only one worker in pathology and clinical pathology, the work on the examination of the brains of post mortem cases has been discontinued. No examinations of the material was made during the year. The pathologist has been carrying on examinations formerly performed by the clinical pathologist, and in addition has made some examinations of the milk of the institution. Wassermann and cerebrospinal fluid examinations have been made for the hospital during the past three and one-half months by the staff of the Army Medical School, during the illness of the pathologist. The routine examinations of urine, sputum, etc., have been made by the ordinary laboratory force during the absence of the pathologist.

During the year the number of autopsies was the greatest in the history of the laboratory, viz, 184.

Psychological laboratory.—During the year attention has been chiefly directed to the general problems of reeducation, and a considerable amount of new material dealing with the matter has been collected. Much of the work has been with animals to discover some of the underlying facts, which must be known before we can appreciate the methods of reeducation in man, and the possibilities of such

reeducation in different kinds of cases. Two pieces of work, accounts of which are now in press, have dealt, respectively, with the recovery of motor function in monkeys after the destruction of the motor areas, and with the retention of learned acts and with the possibility of learning new acts or of relearning old habits (if they have been abolished after the cerebral destructions) after destructions of considerable areas of the brain of the white rat. The results already obtained show a considerable degree of functional adaptation after cerebral destructions, and they lead to the belief that if human individuals, suffering from the effects of cerebral accidents, were suitably and properly dealt with the defects which have been assumed to be necessary in such cases need not be permanent and as incapacitating as have been believed. With the country now at war, and with the probable return of wounded soldiers from the front, the results of these investigations have much more than the usual interest.

The beginnings of an investigation into the capacity of individuals with lesions in the lenticular zone for improvement were made, and the results were encouraging, but not conclusive. It appeared that some improvement in these cases could be hoped for if they were dealt with regularly and actively, although sufficient results have not been obtained to make any publication worth while up to the present time.

Course for internes: The regular course for internes was given to five internes, and all attained a grade equal to or more than that required.

The exercises were similar to those previously given, there being 39 as follows: Dr. White, 6; Dr. Chapman, 4; Dr. Franz, 11; Dr. Hassall, 3; Dr. Kempf, 3; Dr. O'Malley, 3; Dr. Pfeiffer, 8; and Mr. Fenning, 1. We are again indebted to Mr. Fenning for a lecture on some medical legal matters which are important for the internes to know.

PUBLICATIONS.

White, William A., superintendent:

Friends of the insane—Johann Christian Reil. The Psychogram. August, 1916.

Mechanisms of character formation. The Macmillan Co., New York, 1916, pp. 1–342.

The meaning of the mental hygiene movement. Boston Medical and Surgical Journal. Vol. CLXXV, No. 8, pp. 264–269, Aug. 24, 1916. Reprinted by Massachusetts Society for Mental Hygiene.

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Underlying concepts in mental hygiene. Mental Hygiene, Vol. I, No. 1, pp. 7–15, January, 1917.

Psychoanalytic tendencies. The American Journal of Insanity, Vol. LXXIII, No. 4, April, 1917, pp. 599–607. (Read at the seventy-second annual meeting of the American Medico-Psychological Association, New Orleans, La., Apr. 4–7, 1916.)

Psychoanalysis and the practice of medicine. Journal of the American Medical Association, June 2, 1917, Vol. LXVIII, pp. 1591–1596.

Franz, Shepherd Ivory, scientific director:

On certain fluctuations in cerebral function in aphasics. Jour. of Experimental Psychology, 1916, vol. 1, pp. 355–364.

Cerebral adaptation versus cerebral organology. Psychol. Bull. 1917, vol. 14, pp. 137–140.

The scientific productivity of American professional psychologists. Psychological Review, 1917, vol. 24, pp. 197–219.

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Kempf, Edward J., clinical psychiatrist:
The social and sexual behavior of infrahuman primates with some comparable facts in human behavior. The Psychoanalytic Review, vol. iv, No. 2, April, 1917, pp. 127–154.
A study of the anesthesia, convulsions, vomiting, visual constriction, erythema, and itching of Mrs. V. G., pp. 1–24. The Journal of Abnormal Psychology, vol. xii, No. 1, April–May, 1917.
O'Malley, Mary, clinical director:
The report of twelve cases of pellagra and its relation to mental disease. The Interstate Medical Journal, 1916, xxiii, pp. 513–528.
Glueck, Bernard, senior assistant physician, resigned:
Studies in forensic psychiatry. Criminal Science Monographs, 277 p. 8vo.
(*With Dr. Lind.*) The neurotic constitution. Translated from the German of Dr. Adler. Moffat, Yard & Co., 480 pp.
Lind, John E., senior assistant physician:
Sleep and its disorders. Reference handbook of the Medical Sciences, Vol. VII, 1917, pp. 775–781.
The treatment of delirium tremens. New York Medical Journal, Feb. 3, 1917, vol. cv, No. 5, p. 217.
Dietetic fads and fancies. New York Medical Journal, Apr. 28, 1917, vol. cv, No. 17, pp. 793–795, and May 12, 1917, vol. cv, No. 19, pp. 889–892.
The possible etiology of pelvic disease in epilepsy: with report of a case. (*With Dr. J. Lewis Riggles.*) Virginia Medical Semi-monthly, Vol. XXI, pp. 161–168.
Treating maniacs with water. Popular Science Monthly, March, 1917, Vol. XC, No. 3, pp. 401–404.
The mental examination of negroes. International Clinics, September, 1916, 26th series, Vol. III, pp. 205–218.
The prevention and treatment of bedsores. The Nurse, February, 1917, Vol. VI, No. 6, pp. 384–386.
The nursing of delirium tremens. The Nurse, June, 1917, Vol. VI, No. 6, pp. 384–386.
(*Translation of Wilhelm Stekel.*) The technique of dream interpretation. The Psychoanalytic Review, January, 1917, Vol. IV, No. 2, pp. 84–109.
(*With Dr. Glueck, translation of Alfred Adler.*) The neurotic constitution. Moffat, Yard & Co., New York, 1917.
Pfeiffer, J. A. F., senior assistant physician:
The anatomical findings in a case of progressive lenticular degeneration. The Journal of Nervous and Mental Disease, No. 4, vol. 45, April, 1917, pp. 289–311.
Murphy, J. P. H., assistant physician:
A study in superstition. International Clinics, March, 1917, vol. 27.
Shockley, Francis M., assistant physician, resigned:
Clinical cases exhibiting unconscious defense reactions. The Psychoanalytic Review, Vol. III, 1916, pp. 141–160.
Evarts, Arrah B., assistant physician:
A comparative study of cases showing thalamic lesions at autopsy. Journal of Nervous and Mental Diseases, vol. 45, No. 5, pp. 385–400.
The ontogenetic versus the philogenetic elements in the psyche of the colored race. The Psychoanalytic Review, vol. iii, No. 3, pp. 272–287.
Lashley, Karl S., assistant in psychology:
Changes in the amount of salivary secretion associated with cerebral lesions. Amer. Jour. of Physiol., 1917, vol. 43, pp. 42–72.
The accuracy of movement in the absence of excitation from the moving organ. Amer. Jour. of Physiol., 1917, vol. 43, pp. 169–194.
Modifiability of the preferential use of the hands in the Rhesus monkey. Jour. of Animal Behavior, vol. 7, pp. 178–186.
Dooley, Lucille, Ph. D., assistant clinical psychiatrist:
Psychoanalytic studies of genius. The Amer. Jour. of Psychology, July, 1916, pp. 363–416.

NEEDS OF THE HOSPITAL.

The appropriations recommended for the fiscal year ending June 30, 1919, are as follows:

Support, clothing, and treatment at St. Elizabeths Hospital for the Insane from the Army, Navy, Marine Corps, etc.: The amount

required is $426,750. This is an increase over the past year of $126,740. During the past year there were admitted to this institution 898 patients, which is the highest number ever admitted in any year in the history of the institution, 83 more admissions than the previous year, which was the largest year up to that time. On July 1, 1916, there were 3,193 patients, and on June 30, 1917, 3,244, an increase of 51 over the past year. The average number of patients under treatment for the year ending June 30, 1916, was 3,123, and for the year ending June 30, 1917, 3,209, showing an increase in the daily average for the year of 86. It would seem from the foregoing that it is safe to state that our average during the year 1918 will be considerably larger than for the past year, and our average for the year ending June 30, 1919, will undoubtedly show a considerable increase over the past number. While the average during the past year was 3,209, yet we begin this year with 3,244 patients, 35 more than our daily average for last year. Under ordinary circumstances we believe it will be safe to figure a daily average of 3,500 patients for next year. Of these we will expect about 1,850 from the District of Columbia and 1,650 from other sources. But these are not ordinary times; in fact, they are extraordinary times; and there is no safe method in estimating for the next year the number of patients that this institution must care for. It undoubtedly would be safe to estimate that the minimum number to be taken from the District itself will be 1,850; the increased number from the Army of the United States, with a gross total of 1,000,000 men, estimating on only 2 per thousand, would be 2,000; from the Navy, estimating at the same rate, would be 500; from the Marine Corps, Public Health Service, criminals and other sources, not less than 100. The daily average of these classes of patients during the past year was 1,474. Recapitulating, we have:

Daily average of District patients	1,850
Daily average the past year from other sources	1,474
New patients, Army	2,000
New patients, Navy	500
New patients from other sources	100
Total	5,924

Of course there may be many of these patients discharged before others are admitted, but at the minimum we will undoubtedly have not less than a daily average of 5,000 patients to take care of in this institution, unless provision is made to transfer them to other hospitals. These figures must be based on normal conditions, but the present is not a normal state of affairs. We are in the midst of a world's war. Extraordinary conditions prevail and only the merest guess can be hazarded. All of these figures, we have a right to expect, will be materially increased by the actual conditions of war. The number of patients to be cared for here would then largely depend upon the policy of the War Department as to sending the sick back home across the ocean. If they are kept overseas the problem would then be only somewhat delayed until after the war. In view of the foregoing I think the only safe thing to do is to estimate upon a basis of normal conditions—that is, 3,500 patients, 1,850 of which are to be from the District of Columbia and 1,650 from other sources, for which an appropriation is asked from Congress. If the population exceeds this number we must then present the

matter in a deficiency estimate to Congress and ask for additional appropriation to cover any excess that might be needed.

Based upon the population of 3,500, of which we must ask an appropriation for 1,650 direct from Congress, in the sundry civil bill we have requested an appropriation of $426,750. This is based upon the cost of 3,500 patients at $295 per capita, making a total of $1,032,500. Of this amount the District must pay for 1,850 patients at $295 per capita, a total of $545,750. Deducting $55,000 for repairs and improvements and $5,000 for roadways, leaves a balance of $426,750 asked for support in the sundry civil bill. This increase per capita cost of patients during this year is explained, first, on account of the need of extra employees sufficient to put this hospital on an eight-hour basis, and, second, on account of the increased cost of supplies. This would seem to be a conservative estimate in view of the various prices for which contracts have been awarded for the present year. The increase asked for to put the hospital on an eight-hour basis is in order to permit these employees who are directly engaged in the care of patients, constituting what is known as the ward service, and certain others who have not previously had the advantage of the eight-hour law, to enjoy that privilege. Naturally these employees feel that in the operation of the statutes they have been discriminated against, and the hospital can not but feel that the concessions that have been granted have been in the least desirable direction, when the nature of the work which this hospital stands for is considered. In other words, the most important function which the hospital subserves is the immediate care of the individual sick patients. All the other functions which are performed by employees are subsidiary to this central one. It would seem, therefore, that every concession should be made to the ward employees that will make for increased efficiency. Observations which have been recently made with regard to the operation of the eight-hour law would indicate that it does increase efficiency, due to the beneficial influence upon the employees themselves, preventing conditions of overfatigue, and therefore bringing them to their work better able to do it. These advantages are, of course, great in number in dealing with the problems which confront institutions of this character. It is highly important that the ward attendants should go on duty refreshed and rested, so that during their periods of duty they may be free from all such tendencies that might express themselves in irritability and crossness toward the patients. In fact, I think there is very little doubt that many of the difficulties which arise and result in minor abuses of patients by employees are dependent upon the employees being tired and irritable.

It is for these reasons that this estimate is presented for the extension of the eight-hour law to the ward employees and to take in other classes not yet covered in its operation. I may state that the State of Illinois has already passed an eight-hour law which applies to its charitable institutions, and so far as I know, this is the only State which has passed such legislation, unless legislation of this character has passed very recently, in which case, of course, it would not have been in operation a sufficient length of time to draw any conclusions from it. I am of the opinion that the United States, as

an employer, should not be far behind in progressive measures, the advantages of which are fairly apparent.

The appropriation asked for would not only permit the employment of an additional number of employees but also would allow a sufficient amount for feeding them and make allowance for paying them enough to provide for their lodging outside the hospital, as we have not room within this institution to accommodate them. This sum would also permit us to make some allowance for others of the same class, who at the present time are compelled to live away from the hospital and for whom there is not sufficient room within the hospital to provide lodging. The appropriation asked for would also be sufficient to cover the increases in salary that are requested.

We have requested that authority be granted to publish a bulletin which shall contain the most important results of scientific work carried on in this hospital. Such a bulletin was printed by the department for some five years. A widespread interest was taken in it and frequently requests were, and still are, received for it. This implied that it was greatly appreciated by other institutions of like character throughout the United States. The existing law (sundry civil act, Mar. 3, 1915, 38 Stat., 382) "prohibits the use of any part of the money therein appropriated for printing and binding except such as shall be certified in writing to the Public Printer by the respective heads or chiefs thereof to be necessary to conduct the ordinary and routine business as required by law." This paragraph makes legislation for this purpose necessary. We thought it advisable, therefore, that this authority be requested of Congress, and if it meets with your approval, the cost thereof to be charged to the appropriation, "Public printing and binding, Department of the Interior." I think the provision highly desirable because a great amount of scientific work is done in this hospital, which is necessarily scattered throughout the literature, a large portion of which never comes to the notice of those for whom it would be most valuable. By collecting it in the form of a bulletin it is brought to the immediate attention of hospitals engaged in similar work, many of which are backward in scientific development and need the stimulus and help supplied by such means.

The amount asked for general repairs and improvements and for roadways, grading and walks is the same as requested for the past year.

Gate house.—We have a new entrance; the road has been cut through and completed and only the new gate house and gates are needed. This hospital has many visitors, relatives and friends of the patients, in addition to sight-seers, and some accommodation should be provided, not only as a convenience while waiting for cars, but also in the way of a public comfort station for visitors while waiting and for general use. With the increased number of patients in this institution this need will be greater.

Staff building.—Additional quarters should be provided for the hospital staff. At the present time they are quartered on the second floor of the Administration Building and in various parts of the institution. The office part of the Administration Building is at present crowded for room and it will not be long before it will be necessary to provide additional room for the various offices. The growth of the institution has been so rapid of late—the increase in

the number of patients together with the number of records required—that a great deal more space for administrative purposes is needed. In line with this it will soon be desirable in seeking additional room to go to the second floor of the Administration Building now being used by the staff officers for their residences. Therefore it is recommended that an appropriation be secured to provide staff quarters to house these officers.

Isolation building.—Included in estimates is an item for an isolation building—$5,000. This is a building on the cottage type, in general construction similar to tubercular cottages recently erected in this institution, having a capacity of five male and five female patients and quarters for four nurses. These buildings are to house that class of patients that are suffering from such class of contagious disease that makes it desirable to isolate them and in this manner prevent the spreading of this kind of disease. Heretofore we have been able to set aside one of the smaller buildings of the institution which is ill adapted and is of more costly construction for this purpose, but now that the population of the institution is increasing it is necessary to utilize all the space available to furnish beds for the regular patients of this institution. It is therefore desirable to provide these additional beds in constructions of this sort which are not better adapted for the purpose but of relatively cheaper construction.

Employees' quarters.—At the present time we are unable to supply the necessary room for all classes of employees that it is desirable to have reside upon the reservation. In connection with this it might be well to call your attention to the fact that while we have a nurses' home for both male and female nurses and attendants under the supervision of a housekeeper, the laundry help are under only limited supervision, and that class of help which would probably need supervision more than the other—that is, kitchen, farm, and mechanical employees—are without adequate supervision. It is therefore requested that an appropriation of $25,000 be secured to build quarters to accommodate these employees.

Railroad scale.—While the Bureau of Standards, when they last tested our scales, stated that they would pass, as they came within the regulations, at the same time they recommended that new ones be purchased, because the ones we have are of the class that will continually need repair, and because they are not large enough to weigh the larger size cars at present in use by the railroads for hauling fuel. New scales of the size and class we need would cost not less than $7,000, and we therefore recommend that an appropriation be asked to cover this amount.

Summary of appropriations recommended.

Support	$972,500
General repairs and improvements	55,000
Roadways, gradings, and walks	5,000
Gate house	8,000
Staff building	25,000
Isolation building	5,000
Railroad scales	7,000
Employees' quarters	25,000
Total	1,102,500

Incidence of tuberculosis.—The usual data regarding the incidence of tubercular conditions found at autopsy are given in the accompanying table:

Pulmonary tuberculosis in those who died during the years ended June 30, 1885–1917.

Date.	Deaths.	Post-mortem examinations.	Cases not examined, post-mortem.	Deaths due to pulmonary tuberculosis.	Well-marked pulmonary tubercular cases, post-mortem.	Cases of latent or limited pulmonary tuberculosis found in autopsies.	Total of pulmonary tubercular cases examined post-mortem.	Cases of pulmonary tuberculosis among those not examined by autopsy, based upon clinical diagnosis.	Total of all cases of death with pulmonary tuberculosis, clinical and post-mortem.	Percentage of pulmonary tubercular cases among those that died, recognized clinically and at autopsy.	Percentage of those examined, post-mortem, which showed pulmonary tubercular lesions.	Cases which died of other diseases than pulmonary tuberculosis.
1885	105	69	36	13	18	3	21	2	23	21.9	30.4	92
1886	102	72	30	24	26	1	27	8	35	34.3	37.5	78
1887	92	49	43	13	9	1	10	9	19	30.6	20.4	79
1888	120	79	41	14	14	6	20	8	28	23.3	25.3	106
1889	114	67	47	23	19	3	22	10	32	28.0	32.8	91
1890	140	108	32	20	22	10	32	6	38	27.1	29.6	120
1891	128	79	49	21	13	5	18	13	31	24 2	22.7	107
1892	153	96	57	13	13	9	22	9	31	20.2	23.0	140
1893	181	117	64	22	34	9	43	8	51	28.1	36.7	159
1894	167	115	52	28	27	13	40	13	53	31.7	34.7	139
1895	179	125	54	18	20	6	26	11	37	20.6	20.8	161
1896	187	119	68	21	23	11	34	12	46	24.6	28.5	166
1897	162	90	72	13	15	4	19	9	28	17.2	21.1	149
1898	197	85	112	19	17	3	20	14	34	17.6	23.5	178
1899	193	81	112	31	22	3	25	20	45	23.3	30.8	162
1900	184	94	90	25	17	6	23	10	33	17.9	24.4	159
1901	226	109	117	31	27	14	41	16	57	25.0	37.8	195
1902	177	92	85	19	20	7	27	7	34	29.3	29.0	158
1903	258	125	133	36	25	18	43	15	58	22.5	34.4	222
1904	243	103	140	28	15	5	20	13	33	13.6	19.4	215
1905	236	114	122	28	18	6	24	12	36	15.2	21.0	208
1906	202	114	88	29	18	11	29	11	40	19.8	25.4	173
1907	216	128	88	33	16	15	31	17	48	22.2	24.2	184
1908	201	128	73	14	12	15	27	4	31	15.4	21.0	187
1909	255	164	91	38	30	29	59	9	68	26.6	35.9	217
1910	260	161	99	25	21	28	49	16	65	25.0	30.5	235
1911	280	165	115	41	28	29	57	8	65	23.2	31.7	239
1912	332	183	149	44	21	59	80	27	107	32.2	43.9	288
1913	321	173	148	40	35	48	83	17	100	31.2	47.9	281
1914	322	123	199	30	14	26	40	16	56	17.7	32.5	292
1915	337	159	178	33	22	20	42	17	59	22.7	26.4	304
1916	338	157	181	32	17	18	35	16	51	15.0	22.2	306
1917	434	184	250	57	22	36	58	22	80	18.4	31.5	377
Total	7,042	3,837	3,215	876	670	477	1,147	405	1,552	23.2	28.9	6,167

STAFF CHANGES.

The following resignations took effect during the year: Bernard Glueck, senior assistant physician; James F. Hooker, junior assistant physician; Dudley C. Kalloch, junior assistant physician; William D. Napheys, medical interne; Joseph Nack, junior assistant physician; Neal A. Harper, dental interne; Walter G. Doherty, dental interne; Percy C. Anders, medical interne.

The following new appointments were made: Ross McC. Chapman, first assistant physician; David G. Sampson, medical interne; Vachelle E. Harmon, medical interne; James F. Hooker, medical interne; William D. Napheys, medical interne; Helen D. Kempf, medical interne; Leon E. Duvall, medical interne; Samuel A. Silk,

medical interne; Percy C. Anders, medical interne; Burgh S. Burnet, medical interne; Walter G. Doherty, dental interne, and Adolph Jacobs, medical interne.

STATISTICAL TABLES.

Admissions and discharges.

	Male.			Female.			Total.
	White.	Colored.	Total.	White.	Colored.	Total.	
Remaining June 30, 1916:							
Army	850	51	901				901
Navy	295	17	312				312
U. S. Public Health Service	46	6	52				52
Civil life	736	340	1,076	543	309	852	1,928
Total	1,927	414	2,341	543	309	852	3,193
Admitted during the year 1916–17:							
Army	239	16	255				255
Navy	86	5	91				91
U. S. Public Health Service	24	1	25				25
Civil life	193	104	297	146	84	230	527
Total	542	126	668	146	84	230	898
Discharged during the year 1916–17:							
Recovered—							
Army	68	4	72				72
Navy	22	1	23				23
U. S. Public Health Service	6	2	8				8
Civil life	36	12	48	37	12	49	97
Total	132	19	151	37	12	49	200
Improved—							
Army	18		18				18
Navy	3		3				3
U. S. Public Health Service	2		2				2
Civil life	32	6	38	23	8	31	69
Total	55	6	61	23	8	31	92
Unimproved—							
Army	11	1	12				12
Navy	6		6				6
U. S. Public Health Service							
Civil life	43	11	54	14	14	28	82
Total	60	12	72	14	14	28	100
Not insane—							
Army	11		11				11
Navy	4		4				4
U. S. Public Health Service							
Civil life	2	2	4		1	1	5
Total	17	2	19		1	1	20
Deceased—							
Army	127	12	139				139
Navy	26	5	31				31
U. S. Public Health Service	4		4				4
Civil life	86	66	152	70	39	109	261
Total	243	83	326	70	39	109	435
Remaining June 30, 1917:							
Army	854	50	904				904
Navy	320	16	336				336
U. S. Public Health Service	58	5	63				63
Civil life	730	347	1,077	545	319	864	1,941
Total	1,962	418	2,380	545	319	864	3,244

Admissions and discharges, classified according to sex, for the year ended June 30, 1917, and since the opening of the hospital in 1855.

	Year ending June 30, 1917.			Since opening of the hospital.		
	Male.	Female.	Total.	Male.	Female.	Total.
Admitted	668	230	898	18,364	5,497	23,861
Discharged:						
Recovered	170	50	220	5,843	1,405	7,248
Improved	61	31	92	2,511	971	3,482
Unimproved	72	28	100	1,025	412	1,437
Died	326	109	435	6,605	1,845	8,450
Remaining	2,380	864	3,244	.....	.....	.....
Total admissions	.....	.....	.....	18,364	5,497	23,861

Percentage of total admissions recovered, improved, etc.

	Male.	Female.	Total.
Recovered	31.86	25.57	30.37
Improved	13.68	17.67	14.59
Unimproved	5.61	7.50	6.02
Died	35.92	33.56	35.42
Remaining	12.93	15.70	13.60
Total	100.00	100.00	100.00

Monthly changes of population.

	Admitted.			Discharged.			Died.			Total died and discharged.
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	
1916.										
July	45	22	67	31	7	38	24	7	31	67
August	45	22	67	20	9	29	10	5	15	44
September	62	12	74	21	7	28	33	8	41	69
October	40	22	62	24	8	32	26	14	40	72
November	34	16	50	27	10	37	40	6	46	83
December	76	21	97	18	9	27	21	10	31	58
1917.										
January	47	19	66	19	10	29	34	18	52	81
February	63	16	79	19	7	26	25	10	35	61
March	73	10	83	30	15	45	37	12	49	94
April	42	21	63	24	10	34	21	3	24	58
May	51	19	70	26	7	33	32	11	43	76
June	89	31	120	43	11	54	23	5	28	82
Total	668	230	898	203	109	412	326	109	435	847

Ages of patients admitted during the year ended June 30, 1917.

Age.	Male.	Female.	Total.	Age.	Male.	Female.	Total.
6 to 15 years	6	2	8	50 to 60 years	47	18	65
15 to 20 years	27	14	41	60 to 70 years	42	26	68
20 to 25 years	122	23	145	70 to 80 years	52	20	72
25 to 30 years	111	21	132	80 to 90 years	12	5	17
30 to 35 years	73	19	92	Over 90 years	3	.....	3
35 to 40 years	77	36	113	Unknown	4	.....	4
40 to 45 years	53	22	75				
45 to 50 years	39	24	63	Total	668	230	898

Civil condition of patients admitted during the year ended June 30, 1917.

	Male.	Female.	Total.
Single	416	79	495
Married	176	92	268
Widowed	62	56	118
Divorced	5	.....	5
Unknown	9	3	12
Total	668	230	898

Ages of patients who died during the year ended June 30, 1917.

Age.	Male.	Female.	Total.	Age.	Male.	Female.	Total.
15 to 20 years	3	1	4	50 to 60 years	31	22	53
20 to 25 years	7	2	9	60 to 70 years	47	18	65
25 to 30 years	14	3	17	70 to 80 years	83	23	106
30 to 35 years	29	3	32	80 to 90 years	27	12	39
35 to 40 years	32	6	38	Over 90 years	4	3	7
40 to 45 years	28	6	34				
45 to 50 years	21	10	31	Total	326	109	435

Duration of mental disease of patients who died during the year ended June 30, 1917.

	Male.	Female.	Total.		Male.	Female.	Total.
Under 1 month	15	4	19	4 to 6 years	24	1	25
1 to 2 months	13	5	18	6 to 10 years	29	8	37
2 to 4 months	20	8	28	10 to 15 years	20	4	24
4 to 6 months	11	6	17	15 to 20 years	14	7	21
6 to 9 months	15	5	20	20 to 25 years	6	4	10
9 to 12 months	22	7	29	Over 25 years	25	11	36
12 to 18 months	41	12	53				
8 months to 2 years	30	6	36	Total	326	109	435
2 years to 4 years	41	15	56				

Ages of patients discharged recovered during the year ended June 30, 1917.

	Male.	Female.	Total.
15 to 20 years	11	3	14
20 to 30 years	79	16	95
30 to 40 years	34	12	46
40 to 50 years	16	13	29
50 to 60 years	6	5	11
60 to 70 years	5	.....	5
Total	151	49	200

Duration of residence in the hospital of those recovered during the year ended June 30, 1917.

	Male.		Female.		Total.
	White.	Colored.	White.	Colored.	
20 to 30 days	2	.....	5	1	8
1 to 2 months	2	1	6	1	10
2 to 3 months	13	2	2	1	18
3 to 4 months	25	1	3	1	30
4 to 6 months	30	1	2	2	35
6 to 9 months	21	2	3	1	27
9 to 12 months	14	3	3	1	21
1 to 2 years	7	2	5	2	16
2 to 4 years	18	7	8	2	35
Total	132	19	37	12	200

Nativity of patients admitted during the year and since opening of the hospital in 1855.

	During year.	Since 1855.
Native born:		
Alabama	3	84
Arkansas	2	47
Arizona	.....	3
California	6	51
Colorado	1	21
Connecticut	2	144
Dakota	.....	16
Delaware	2	45
District of Columbia	126	3,152
Florida	2	27
Georgia	10	169
Illinois	17	337
Indiana	8	331
Indian Territory	.....	19
Idaho	1	3
Iowa	10	89
Kansas	2	71
Kentucky	16	338
Louisiana	5	77
Maine	4	178
Maryland	60	1,785
Massachusetts	11	647
Michigan	7	157
Minnesota	.....	42
Mississippi	.....	73
Missouri	10	206
Montana	.....	3
Nebraska	1	18
New Hampshire	1	101
New Jersey	11	235
New Mexico	.....	5
New York	55	1,457
North Carolina	15	241
Ohio	30	816
Oklahoma	2	7
Oregon	1	6
Pennsylvania	40	1,215
Rhode Island	1	77
South Carolina	9	105
Tennessee	11	219
Texas	11	106
Utah	1	4
Vermont	3	87
Virginia	101	2,336
West Virginia	10	114
Wisconsin	6	104
United States	91	1,415
Total	705	16,783
Foreign born:		
Alsace	1	2
Armenia	1	4
Austria	14	130
Bahamas	1	2
Bavaria	.....	17
Belgium	.....	9
Bermuda	.....	2
Bohemia	.....	13
Brazil	.....	1

	During year.	Since 1855.
Foreign born—Continued.		
British East Indies	.....	9
British Columbia	.....	2
British possessions	.....	4
British West Indies	.....	15
Buenos Aires	.....	3
Canada	2	193
Cape Verde Islands	.....	1
Chile	.....	2
Coast of Africa	1	4
Costa Rica	.....	2
Cuba	.....	10
Cyprus	.....	1
Denmark	.....	60
England	7	455
Ecuador	.....	1
Finland	3	18
France	4	117
Germany	27	1,800
Greece	5	26
Guatemala	.....	1
Holland	.....	22
Hungary	7	40
Iceland	.....	1
Ireland	23	2,474
Italy	6	127
Japan	1	17
Korea	.....	1
Malta	.....	3
Mexico	1	18
New Brunswick	.....	4
Newfoundland	.....	5
New Granada	.....	1
Norway	.....	78
Nova Scotia	.....	25
Panama	.....	1
Philippine Islands	5	18
Poland	.....	39
Portugal	.....	9
Prince Edward Island	.....	3
Prussia	.....	42
Porto Rico	1	5
China	.....	6
Roumania	.....	8
Russia	22	146
Hawaiian Islands	.....	3
Saxony	.....	7
Scotland	.....	116
Sicily	.....	3
Spain	.....	10
Sweden	5	133
Switzerland	2	88
Turkey	.....	10
Wales	.....	24
West Indies	.....	9
At sea	.....	1
Unascertained	54	677
Total	193	7,078
Grand total	898	23,861

Forms of mental disease in patients admitted during the year ended June 30, 1917.

Disease.	Male.		Female.		Total.
	White.	Colored.	White.	Colored.	
Infection-exhaustion psychosis: Symptomatic psychosis	1			4	5
Toxic psychosis:					
Exogenous					
Endogenous	11	2	7	1	21
Alcoholic psychosis	3	3			6
Organic brain disease	15	3	12	10	40
Cerebral arteriosclerosis	10	15	9	4	38
Psychosis associated with epilepsy	11	3	2	2	18
Cerebral syphilis	3	6			9
General paresis	68	23	2	5	98
Senile dementia	41	13	17	5	76
Dementia precox:					
Hebephrenic	14	13	2		29
Catatonic	6	2	7		15
Paranoid	20	9	19	4	52
Undifferentiated	206	5	20	27	258
Manic-depressive psychosis	33	4	27	7	71
Paranoia	4	1	3		8
Prison psychosis	4	2		1	7
Defective states:					
Idiocy	1	2			3
Imbecility	5	4	2	6	17
Moronism	1	1		1	3
Constitutional inferiority	5	1	1		7
Constitutional psychopathy	8		2		10
Undifferentiated psychosis	30	6	1	3	40
Confusion	1		2	2	5
Depression	1		1		2
Excitement				1	1
Paranoid state	15	6	6	1	28
Unclassified psychosis	9	2			11
Alcoholic hallucinosis	3		1		4
Chronic alcoholism	2		2		4
Morphinism			1		1
Not insane	11				11
Total	542	126	146	84	898

Admissions, discharges, and deaths, with the mean annual mortality and proportion of recoveries, per cent of the discharges, including deaths, for each year since the opening of the hospital.

Year.	Admitted.			Discharged.													Remaining June 30 in each year.			Daily average.			Percentage of recoveries on discharges.			Percentage of deaths on average numbers.			Percentage of deaths on total number.		
				Recovered.			Improved.			Unimproved.			Died.																		
	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.
1855	26	37	63	....	3	3	....	....	....	....	....	....	....	....	....	26	34	60	19.35	20.65	40.00	....	100.00	100.00	....	....	....	8.06	6.66	7.48
1855–56	36	11	47	3	2	5	....	....	....	....	....	....	1	1	2	54	39	93	41.20	37.98	79.18	37.50	33.33	35.71	12.13	7.09	10.10	8.06	6.66	7.48
1856–57	25	27	52	2	4	6	3	1	4	7	3	10	8	8	16	59	50	109	54.55	42.80	97.35	10.00	25.00	16.66	14.66	18.69	16.43	10.13	12.12	11.03
1857–58	29	14	43	13	5	18	1	1	2	2	....	2	7	6	13	65	52	117	57.70	50.31	108.01	56.52	44.66	51.42	12.13	11.92	12.03	7.95	9.37	8.55
1858–59	47	18	65	16	5	21	1	4	5	5	3	8	6	4	10	84	54	138	72.93	56.24	129.17	57.13	31.25	47.73	8.22	7.11	7.74	5.36	5.71	5.49
1859–60	68	24	92	26	7	33	4	3	7	3	2	5	13	5	18	106	61	167	100.68	59.00	159.68	56.52	41.17	52.38	12.91	8.47	11.27	8.55	6.41	7.25
1860–61	64	31	95	42	11	53	5	2	7	2	....	2	12	7	19	109	72	181	109.72	64.81	174.57	68.85	55.55	65.43	10.93	10.80	10.88	7.06	7.61	7.82
1861–62	174	12	186	96	8	104	14	1	15	....	....	....	26	10	36	147	65	212	123.75	65.74	189.49	70.59	42.10	67.09	21.01	15.21	19.00	9.18	11.90	9.81
1862–63	330	25	355	197	6	203	17	1	18	3	3	6	57	4	61	203	76	279	168.41	72.31	240.72	71.89	42.85	70.45	33.84	5.53	25.34	11.95	4.44	10.76
1863–64	484	25	509	282	6	288	69	1	70	5	....	5	67	8	75	364	86	350	205.73	77.66	283.39	66.66	40.00	65.75	42.56	10.30	26.40	11.75	7.92	9.51
1864–65	478	36	514	315	9	324	110	12	122	11	....	11	139	8	147	167	93	200	277.42	33.81	361.23	54.78	31.03	53.64	50.10	9.54	40.69	18.73	6.55	17.01
1865–66	194	28	222	104	5	109	20	7	27	10	1	11	41	12	53	186	96	282	190.92	90.70	281.62	59.42	20.00	54.50	21.47	13.23	18.82	11.35	9.91	10.99
1866–67	88	21	109	45	7	52	11	3	14	11	1	12	19	14	33	188	92	280	189.06	89.46	279.12	52.32	28.00	46.85	10.02	15.65	11.82	6.93	11.96	8.44
1867–68	120	33	153	49	15	64	6	2	8	5	1	6	22	5	27	226	102	328	221.17	96.44	317.61	59.75	65.22	60.95	9.95	5.18	9.50	7.14	4.00	6.23
1868–69	133	35	168	59	11	70	9	6	15	8	2	10	24	9	33	259	109	368	244.55	108.03	352.58	59.00	39.28	54.69	9.81	8.33	9.35	6.70	6.57	6.65
1869–70	146	36	182	32	8	40	18	8	24	11	3	14	15	3	18	331	123	454	294.69	108.08	402.77	43.24	36.37	41.67	5.09	2.77	4.36	3.71	2.05	3.27
1870–71	161	34	195	50	12	62	21	7	28	4	3	7	33	11	44	384	124	508	354.34	121.66	476.00	46.30	36.36	43.97	9.31	9.04	9.24	6.70	7.00	6.78
1871–72	142	44	186	43	8	51	16	13	29	8	1	9	37	7	44	422	139	561	407.21	131.57	538.78	41.34	27.59	38.34	9.09	5.32	8.16	7.04	4.17	6.34
1872–73	153	51	204	49	15	64	23	5	28	3	5	8	32	13	45	468	152	626	431.03	144.11	575.14	45.40	39.47	44.13	7.42	9.02	7.82	5.56	6.84	5.88
1873–74	192	38	230	67	12	79	22	8	30	6	3	9	39	11	50	526	156	682	492.44	151.36	643.80	50.00	35.29	47.02	7.92	7.27	7.76	5.91	5.79	5.88
1874–75	179	51	230	66	9	75	28	22	50	8	3	11	51	7	58	552	166	718	536.46	164.17	700.63	42.13	21.95	38.66	9.50	4.26	8.27	7.23	3.38	6.36
1875–76	166	47	213	67	17	84	26	10	36	1	....	1	48	18	66	570	168	744	564.78	165.59	730.37	47.18	37.78	45.45	8.49	10.87	9.04	6.68	8.45	7.09
1876–77	147	51	198	66	17	83	27	13	40	2	....	2	45	7	52	583	182	765	587.41	176.30	763.71	47.80	45.94	46.89	7.66	3.96	6.80	6.22	3.19	5.52
1877–78	138	44	182	49	11	60	32	9	41	3	4	7	37	9	46	600	193	793	596.82	184.37	781.19	40.49	33.33	38.96	6.19	4.88	5.88	5.13	5.98	4.35
1878–79	169	53	222	68	24	92	30	7	37	3	1	4	51	12	63	617	202	819	619.10	196.70	815.80	44.73	54.54	46.93	8.23	6.10	7.72	6.63	4.87	6.20
1879–80	181	44	225	38	14	52	23	10	33	....	3	3	46	13	59	691	206	897	655.34	196.63	851.97	35.51	35.00	35.37	7.01	6.61	6.92	5.76	5.28	5.65
1880–81	161	62	223	62	10	72	27	9	36	....	6	6	63	18	81	700	225	925	685.37	111.38	896.78	40.78	23.25	36.92	9.19	8.51	9.03	7.39	6.71	7.23
1881–82	178	69	247	62	21	83	31	8	39	2	5	7	74	27	101	709	233	942	697.10	232.88	929.98	36.69	34.43	36.08	10.61	11.59	10.86	8.44	9.18	8.61
1882–83	201	64	265	76	19	95	33	16	49	....	6	6	46	17	63	755	239	994	729.89	235.27	965.16	49.05	31.03	44.13	6.30	7.22	6.52	5.05	5.72	5.22
1883–84	286	64	347	68	13	81	35	8	43	3	1	4	51	16	67	884	262	1,146	797.21	243.27	1,040.48	42.03	34.21	40.51	6.39	6.57	6.44	4.90	5.33	4.99
1884–85	229	91	320	65	24	89	37	12	49	1	1	2	84	21	105	926	295	1,221	902.41	270.89	1,173.34	34.76	41.37	36.32	9.31	7.75	8.94	7.55	5.95	7.19
1885–86	234	69	303	55	22	77	58	15	73	2	3	5	79	23	102	966	301	1,267	936.39	283.23	1,219.62	28.35	34.92	29.96	8.54	8.12	8.36	6.81	6.32	6.69
1886–87	206	62	268	57	15	72	49	17	66	2	1	3	73	19	92	991	311	1,302	956.07	297.36	1,253.43	31.49	28.48	30.90	7.63	6.38	7.34	6.22	5.23	5.99
1887–88	247	71	318	59	10	69	52	14	66	3	1	4	95	25	120	1,029	332	1,361	1,009.55	315.55	1,325.08	28.23	20.09	26.64	9.41	7.92	9.06	7.67	5.64	7.41
1888–89	213	67	380	50	20	70	27	27	54	5	2	6	86	28	114	1,075	322	1,397	1,049.99	323.83	1,373.82	29.94	25.97	28.69	8.19	8.65	8.30	6.92	7.02	6.90
1889–90	274	71	345	39	6	45	43	6	49	....	3	3	112	28	144	1,115	350	1,055	1,108.57	326.53	1,435.10	20.10	13.95	18.12	10.13	9.59	9.76	8.30	7.48	8.04

1890–91	371	81	352	36	30	66	38	15	53	1	1	2	98	30	128	1,253	355	1,608	1,160.62	344.44	1,505.06	20.81	34.47	26.51	8.44	8.71	8.51	6.87	6.96	0.89
1891–92	223	70	303	56	12	68	69	13	82	8	3	11	121	32	153	1,232	365	1,597	1,226.64	348.65	1,575.29	22.05	20.00	21.66	9.86	9.18	9.71	8.14	7.53	8.01
1892–93	261	84	345	57	10	67	46	23	69	4	1	5	140	41	181	1,246	374	1,620	1,255.56	357.02	1,582.58	23.08	13.33	20.81	11.41	11.48	11.44	9.38	9.13	9.32
1893–94	273	88	361	49	13	62	49	16	65	6	....	6	138	29	167	1,277	404	1,681	1,248.16	369.91	1,618.07	20.24	22.41	20.66	11.31	7.84	10.32	9.08	6.27	8.42
1894–95	293	78	371	68	30	98	40	32	72	1	....	1	143	36	179	1,318	384	1,702	1,280.91	386.16	1,667.07	26.98	30.61	28.00	11.16	9.32	10.73	9.10	7.46	8.72
1895–96	278	92	370	74	15	89	39	14	53	7	1	8	146	41	187	1,330	405	1,735	1,290.08	379.25	1,669.33	27.81	21.12	26.40	11.31	10.81	11.20	9.14	8.61	9.02
1896–97	288	88	377	67	17	84	50	44	94	5	....	5	130	32	162	1,367	400	1,767	1,326.08	383.82	1,709.90	26.58	18.27	24.34	9.80	8.33	9.47	8.02	6.49	7.67
1897–98	347	90	437	84	12	296	30	19	49	8	1	9	167	30	197	1,425	428	1,853	1,388.25	409.75	1,798.00	29.06	19.35	27.35	12.03	7.32	10.96	9.74	6.12	8.94
1898–99	498	105	603	173	16	189	59	29	88	38	10	48	158	35	193	1,495	443	1,938	1,438.33	433.51	1,871.84	40.42	17.77	36.48	10.98	8.07	10.31	8.21	6.56	7.85
1899–1900	434	117	551	118	33	151	55	13	65	8	5	13	152	32	184	1,599	477	2,076	1,504.00	444.54	1,948.54	35.75	39.75	36.56	10.10	7.19	9.44	7.87	5.71	7.39
1900–1901	519	136	655	202	33	235	52	25	77	11	6	17	193	33	226	1,660	516	2,176	1,583.33	483.33	2,066.66	44.10	34.02	42.34	12.19	6.83	10.93	9.11	5.38	8.27
1901–2	532	154	686	209	39	248	78	20	98	9	11	20	137	40	177	1,759	557	2,316	1,675.85	518.16	2,194.01	48.26	34.51	45.42	8.17	7.70	8.06	6.24	5.97	6.18
1902–3	554	180	734	211	50	261	106	25	131	19	6	25	189	69	258	1,782	587	2,369	1,737.58	553.58	2,291.16	39.73	33.33	38.32	10.88	12.47	11.26	8.17	9.36	8.45
1903–4	584	182	766	194	42	236	95	35	130	21	13	34	189	54	245	1,867	625	2,492	1,783.08	577.00	2,360.08	38.87	29.16	36.70	10.60	8.66	10.29	7.98	6.50	7.75
1904–5	493	174	667	151	53	204	101	42	143	12	9	21	181	55	236	1,912	639	2,551	1,848.50	598.00	2,446.50	33.70	33.12	33.55	9.79	9.19	9.64	7.66	6.88	7.47
1905–6	421	180	601	173	60	233	94	33	127	29	13	42	150	52	202	1,887	661	2,548	1,887.50	654.50	2,542.00	38.34	37.34	38.07	7.94	7.95	7.94	6.42	6.34	6.40
1906–7	437	182	619	136	45	181	82	52	134	28	12	40	165	51	216	1,913	683	2,596	1,898.10	671.83	2,569.93	32.60	27.50	31.17	8.69	7.60	8.40	7.09	6.05	6.82
1907–8	472	171	643	123	39	162	80	30	110	28	5	33	156	45	201	1,998	735	2,733	1,965.70	699.00	2,664.70	31.52	32.77	32.40	7.93	6.43	7.54	6.54	5.27	6.20
1908–9	517	174	691	133	60	193	52	30	82	35	7	42	185	70	255	2,110	742	2,852	2,061.00	740.66	2,801.66	31.11	34.13	31.99	8.97	9.46	9.10	7.35	7.70	7.44
1909–10	496	154	650	115	56	171	54	20	74	55	26	81	189	71	260	2,193	723	2,916	2,138.91	734.00	2,872.91	23.00	26.89	24.06	8.87	9.67	9.05	7.25	7.92	7.42
1910–11	443	180	623	165	50	215	47	13	60	96	26	122	212	68	280	2,116	746	2,867	2,143.33	740.67	2,884.00	31.73	31.85	31.76	9.89	9.19	9.70	8.04	7.52	7.91
1911–12	543	190	733	160	51	211	33	19	52	72	30	102	258	74	332	2,136	762	2,898	2,124.43	747.32	2,871.75	30.60	29.31	30.01	12.14	9.96	11.52	9.70	7.90	9.24
1912–13	549	197	746	125	49	174	37	20	27	70	34	104	252	69	321	2,201	787	2,988	2,165.36	785.30	2,950.66	35.34	36.79	35.82	11.64	8.78	10.87	9.38	7.19	8.80
1913–14	572	180	752	115	48	163	42	18	60	99	44	133	250	72	322	2,267	795	3,062	2,231.40	794.00	3,025.40	36.32	43.00	38.20	11.21	9.07	10.64	9.01	7.44	8.61
1914–15	471	185	656	103	30	133	50	23	73	71	28	99	265	72	337	2,201	827	3,076	2,225.00	807.50	3,032.50	23.11	19.60	20.72	11.91	8.92	11.12	9.68	7.35	9.06
1915–16	617	198	815	128	47	175	52	29	81	74	30	104	271	67	338	2,341	852	3,193	2,293.70	829.80	3,123.50	24.38	27.74	25.07	11.82	8.08	10.82	9.49	7.51	8.73
1916–17	668	230	998	170	50	220	61	31	92	72	28	100	326	109	435	2,380	864	3,246	2,351.34	857.66	3,209.00	27.01	22.93	24.80	13.86	12.70	13.56	10.50	10.07	10.63

Twenty "not insane," 19 males and 1 female, are included with recovered in 1916–17.

Detailed statement of receipts and expenditures for the fiscal year ending June 30, 1916—Additional.

RECEIPTS.

On hand as stated in last annual report—	
Support, 1916	$8,797.65
Buildings and grounds—	
General repairs and improvements	5,702.21
Roadways, grading, and walks	830.85
Miscellaneous receipts	131.71
Deficiency appropriation, District of Columbia	6,558.39
	22,020.81

EXPENDITURES.

Provisions and stores:		
Laundry supplies	$2,887.25	
Crockery and china	195.51	
Household supplies	766.31	
		3,849.07
Furniture and bedding:		
Furniture	2,018.00	
Table linen	137.01	
Carpets	1,270.00	
		3,425.01
Dry goods and clothing:		
Clothing material	265.91	
Shoes and slippers, men's	725.34	
Shoes and slippers, women's	9.35	
		1,000.60
Medical supplies:		
Medical supplies	3.11	
Surgical supplies	70.00	
		73.11
Farm and garden:		
Wagons and harness	6.00	
Horticultural supplies	165.27	
Farm feed	157.39	
		328.66
Miscellaneous: Messages		.40
Books and stationery:		
Books	353.58	
Periodicals	178.65	
		532.23
Construction:		
Engineers' supplies	2,172.23	
Electrical supplies	3,181.18	
		5,353.41
Buildings and grounds:		
Roadways, grading, and walks	747.30	
General repairs and improvements	4,951.32	
		5,698.62
On hand: Balance, support	925.26	
Buildings and grounds:		
Roadways, grading, and walks	83.55	
General repairs and improvements	750.89	
		1,759.70
		22,020.81

Detailed statement of receipts and expenditures for the fiscal year ending June 30, 1917.

RECEIPTS.

Appropriated for:	
Support	$285,250.00
District of Columbia patients	409,537.50
Board of Marine Hospital Service patients	9,540.00
Board of patients	30,528.58
Sale of stock, etc	7,072.72
Buildings and grounds, 1917:	
General repairs and improvements	55,000.00
Roadways, grading, and walks	5,000.00
New fence	14,000.00
Electric elevators	3,675.00
Remodeling ice plant	19,000.00
Buildings and grounds, continuous: Shop and storehouse	24,755.00
	863,358.80

EXPENDITURES.

Provisions and stores:			
Class 1.	Farinaceous foods	$41,639.41	
2.	Compressed yeast	653.99	
3.	Meats, fresh	60,351.49	
4.	Poultry	3,177.00	
5.	Meats, salt and smoked	28,894.05	
6.	Fish, fresh	3,574.96	
7.	Fish, salt	5,294.71	
8.	Vegetables, fresh	7,536.15	
9.	Vegetables, canned	3,045.77	
10.	Fruits, fresh	145.03	
11.	Fruits, dried	3,459.88	
12.	Dairy products	22,957.86	
13.	Groceries, wet	5,052.90	
14.	Groceries, dry	32,336.56	
15.	Condiments	210.23	
16.	Laundry supplies	5,660.13	
17.	Crockery and china	1,287.95	
18.	Tin and iron ware	467.78	
19.	Cutlery and plated ware	59.95	
20.	Household supplies	2,726.79	
21.	Toilet articles	815.90	
22.	Fuel	42,375.64	
			271,724.13
Furniture and bedding:			
Class 23.	Furniture	504.24	
24.	Bedding	9,957.35	
25.	Window furniture	293.76	
26.	Table linen	1,537.59	
27.	Upholstery material	-------	
28.	Sewing machine supplies	5.90	
29.	Carpets, etc	-------	
			12,299.04
Dry goods and clothing:			
Class 30.	Clothing, new	2,578.63	
31.	Clothing material	12,583.12	
32.	Hats, straw	92.00	
33.	Hats, felt	307.50	
34.	Hosiery	1,077.28	
35.	Haberdashery	258.90	
36.	Shoes and slippers, men's	5,918.73	
37.	Shoes and slippers, women's	792.71	
			23,608.87

Medical supplies:			
Class 38.	Medical supplies	$3,629.85	
39.	Surgical supplies	847.75	
40.	Laboratory supplies	193.02	
			$4,670.62
Farm and garden:			
Class 41.	Wagons and harness	2,158.20	
42.	Farm and garden implements	316.62	
43.	Lawns, roads, and grounds	93.73	
44.	Farm supplies	18.00	
45.	Horticultural supplies	1,767.46	
46.	Stable maintenance	175.34	
47.	Live stock	1,965.00	
48.	Farm feed	9,938.18	
49.	Dairy feed	21,404.78	
50.	Poultry feed	738.47	
			38,575.78
Miscellaneous:			
Class 51.	Entertainment of patients	2,501.15	
52.	Traveling expenses	--------	
53.	Supply transportation	--------	
54.	Return of escaped patients	210.00	
55.	Messages	1,229.61	
56.	Miscellaneous	885.35	
57.	Transportation of patients	2.00	
94.	Refund of board money	209.99	
			5,038.10
Books and stationery:			
Class 58.	Stationery supplies	115.73	
59.	Printing	15.53	
60.	Books	49.03	
61.	Periodicals	87.55	
			267.84
Construction:			
Class 62.	Engineers' supplies	2,843.99	
63.	Electrical supplies	3,673.25	
64.	Carpenters' supplies	678.44	
65.	Tinners' supplies	413.07	
66.	Painters' supplies	2,870.67	
			10,479.42
Buildings and grounds:			
Class 67.	Pay roll, roadways, grading and walks	2,312.09	
68.	Roadways, grading and walks	1,193.10	
69.	Pay roll, repairs and improvements	21,375.08	
70.	General repairs and improvements	22,860.28	
71.	For a new fence	23.88	
72.	Shop and storehouse building	6,962.20	
73.	Electric elevators	1,902.50	
74.	Remodeling ice plant, etc.	8,800.12	
93.	Pay roll, remodeling ice plant	1,420.72	
			66,849.97
Salaries and wages:			
Class 75.	Officers	37,323.67	
76.	Administrative	25,963.37	
77.	Ward service	116,021.60	
78.	Domestic service	2,466.14	
79.	Kitchen service	23,163.29	
80.	Industrial	4,609.50	
81.	Laundry	9,798.76	
82.	Fire department	392.50	
83.	Engineers	27,837.85	
84.	Carpenters and builders	3,412.00	
85.	Tinners	375.00	
86.	Construction	1,684.50	
87.	Painters	4,338.58	
88.	Electricians	4,364.66	

Salaries and wages—Continued.		
Class 89. Farm and garden	$15,748.57	
90. Stable	5,738.00	
91. Dairy and cow barns	4,636.04	
92. Lawns and grounds	4,801.15	
		$292,675.18
On hand:		
Support		82,589.82
Buildings and grounds, 1917—		
General repairs and improvements	$10,764.64	
Roadways, grading, and walks	1,494.81	
New fence	13,976.12	
Electric elevators	1,772.50	
Remodeling ice plant, etc	8,779.16	
		36,787.23
Buildings and grounds, continuous: Shop and storehouse building		17,792.80
		863,358.80

Summary of expenditures.

Current expenses:	
Salaries and wages	292,675.18
Clothing	23,608.87
Subsistence	304,639.78
Ordinary repairs	10,479.42
Office, domestic, and outdoor expenses	27,935.73
	659,338.98
Extraordinary expenses: Permanent improvements to existing buildings	66,849.97
Grand total	726,188.95

The report for this year includes expenditures to June 30, 1917, only. The balance of expenditures will be shown in the supplement in next year's report.

	Male.	Female.	Total.
Patients at beginning of fiscal year	2,341	852	3,193
Patients received during the year	668	230	898
Patients discharged and died during the year	629	218	847
Patients remaining at end of fiscal year	2,380	864	3,244
Daily average number of patients during year	2,351	858	3,209
Average number of officers and employees during year	555	305	860

REPORT OF THE COLUMBIA INSTITUTION FOR THE DEAF.

OFFICERS OF THE INSTITUTION.

Patron.—Woodrow Wilson, President of the United States.
President.—Percival Hall, M. A., Litt. D.
Secretary.—Charles S. Bradley, Esq.;[1] Rev. U. G. B. Pierce.
Treasurer.—George X. McLanahan, Esq.
Directors.—Hon. John F. Shafroth, Senator from Colorado; Hon. William E. Humphrey, Member of Congress from Washington;[2] Hon. John E. Raker, Member of Congress from California; Hon. Stephen G. Porter, Member of Congress from Pennsylvania, representing the Congress of the United States; Edward Miner Gallaudet, Ph. D., LL. D., of Connecticut;[3] Hon. John W. Foster,[2] Theodore W. Noyes, Esq.; Charles H. Stockton, LL. D.; Judge Martin A. Knapp, of the District of Columbia; John B. Wight, Esq., of New York; the president, the secretary, and the treasurer of the institution.

FACULTY OF GALLAUDET COLLEGE, 1916–17.

Emeritus president and professor of moral and political science.—Edward Miner Gallaudet, Ph. D., LL. D.[3]
President and professor of applied mathematics and pedagogy.—Percival Hall, M. A., Litt. D.
Vice president and professor of languages.—Edward Allen Fay, M. A., Ph. D., Sc. D., Litt. D.
Professor of English and history.—John Burton Hotchkiss, M. A., Litt. D.
Professor of mathematics and Latin.—Amos G. Draper, M. A., Litt. D.[4]
Professor of natural science.—Charles Russell Ely, M. A., Ph. D.
Professor of English and biology.—Herbert E. Day, M. A.
Professor of mathematics and engineering.—Isaac Allison, E. E.
Assistant professor of Latin and in charge of the college women.—Elizabeth Peet.
Librarian and instructor in English and mathematics.—Helen Northrop, B. A.
Instructor in Latin and natural science.—Victor O. Skyberg, M. A.
Instructor in mathematics and physical director.—Frederick H. Hughes, M. A.
Instructor in agriculture.—Harley D. Drake, B. A.
Instructor in drawing.—Arthur D. Bryant, B. Ph.
Instructor in English and history.—Irving S. Fusfeld, B. S., B. Ped.
Instructor in domestic art.—Agnes Suman.
Instructor in gymnastics.—Helen Devreaux.

DEPARTMENT OF ARTICULATION AND NORMAL INSTRUCTION, 1916–17.

In charge,—Percival Hall, M. A., Litt. D.
Instructors.—Lyman Steed, M. A.; Annie E. Jameson; Sarah H. Porter, M. A.
Normal fellows.—Grace Decker Coleman, B. A., Greenville Woman's College, South Carolina; Urath McCall, B. A., Synodical College, Missouri; Herschel Rodgers Ward, B. A., Mississippi College, Mississippi.
Normal students.—John Keble Cloud, Smith Academy, Missouri; Elizabeth Burhow Thompson, Council Bluffs High School, Iowa.

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[1] Died Nov. 8, 1916.
[2] Resigned during the year.
[3] Died Sept. 26, 1917.
[4] On leave of absence.

FACULTY OF THE KENDALL SCHOOL, 1916–17.

President.—Percival Hall, M. A., Litt. D.
Principal.—Lyman Steed, M. A.
Instructors.—Helen Fay; Musa Marbut, M. A.; Edetha Williams, B. A.; Grace D. Ely; Mary Burch.
Instructor in art and manual training.—Beulah Stebbins.
Instructor in cooking and sewing.—Agnes Suman.

DOMESTIC DEPARTMENT, 1916–17.

Supervisor and disbursing agent.—Louis L. Hooper, M. A.
Attending physician.—Harry H. Donnally, M. D.
Dentist.—J. A. Taylor, D. D. S.
Matron, Gallaudet College.—Mrs. Cora V. Troup.
Girls' matron, Kendall School.—Harriet M. Van Deventer.
Boys' matron, Kendall School.—Mrs. Carrie R. Timberlake.
Boys' supervisor.—Robert L. Unsworth.
Girls' supervisor.—Jennie Kennedy.
Master of shop.—Norman Herrington.
Gardener.—Edward Mangum.
Farmer.—Harley D. Drake, B. A.
Chief engineer.—William J. Muir.

REPORT OF THE COLUMBIA INSTITUTION FOR THE DEAF.

COLUMBIA INSTITUTION FOR THE DEAF, KENDALL GREEN,
Washington, D. C., September 1, 1917.

SIR: The number of deaf pupils and students remaining in the institution on July 1, 1916, was 114; admitted during the year, 56; total, 170; admitted for the school year 1917–18, 52. From July 1, 1916, to July 1, 1917, there were under instruction 95 males and 75 females, a total of 170, of whom 117 have been in the collegiate department, representing 37 States and the District of Columbia; and 53 in the primary department. Of these, 40 were admitted as beneficiaries of the District of Columbia. During the fiscal year 45 were discharged from the institution by graduation and otherwise.

A list of names of students and pupils who have been under instruction in this institution since July 1, 1916, including those admitted for the school year 1917–18, will be found appended to this report.

HEALTH.

The usual standard of good health nas prevailed among the students and pupils of the institution during the year. At three separate times cases of measles were discovered, but prompt isolation and proper treatment prevented anything like an epidemic, and all cases yielded easily to careful treatment.

Since the requirement of inoculation against typhoid fever some years ago, no serious cases of illness have occurred among the whole student body.

Untiring care on the part of our officers, prompt medical attention, together with plentiful supply of properly prepared food and wholesome exercise, has given the institution an unusual record for health.

The work of the dental infirmary has been continued with satisfactory results.

CHANGES IN THE CORPS OF OFFICERS AND TEACHERS.

After 35 years of service as instructor in art, Rev. Arthur D. Bryant, a graduate of the college department in the class of 1880, has retired to devote all of his time and energy to missionary work among the deaf of Washington and neighboring cities. His name has been placed upon the rolls as emeritus instructor.

Miss Charlotte E. Weiss, a graduate of Drexel Institute, Philadelphia, has been appointed instructor in drawing and applied art. She will devote all of her time to instruction in these branches, giving especial attention to the instruction of the young women of

the college in the designing and making of costumes and the study of household decoration.

A complete list of officers for the year 1917–18 will be found in Appendix A at the end of this report.

COURSE OF INSTRUCTION.

The course of instruction during the past year remained the same as during the preceding year, with the exception of the addition of two hours' weekly required work from the sophomore and junior classes of the college for the bachelor's degree.

Plans are under way for the addition of more extended instruction in drawing and applied art and of instruction in printing.

LECTURES.

The following special lectures have been delivered during the year:

IN THE COLLEGE.

Early Washington	Dr. Hotchkiss.
Our Most Important Natural Resource	Dr. Ely.
An Evening with the Stars	Prof. Day.
Waste	Prof. Allison.
The Early Days of St. Francis of Assisi	Miss Peet.
Myths and Legends of Japan	Miss Northrop.
The Science of Stories	Mr. Skyberg.
Four Nations	Mr. Hughes.
Our National Parks (illustrated)	Mr. Drake.

IN THE KENDALL SCHOOL.

Short Stories	Mr. Steed.
Ben Hur	Mr. Ward.
The Man Without a Country	Mr. Cloud.
The Song of Roland	Miss Coleman.
Evangeline	Miss Thompson.

FINANCES.

	Receipts.	Expenses.
HOUSEKEEPING DEPARTMENT.		
Salaries		$4,926.00
Milk	$0.63	26.21
Meat	105.95	5,072.42
Groceries	6.33	4,030.79
Fruit and vegetables		1,415.99
Dairy produce	60.55	1,536.13
Bread and crackers	.30	1,814.79
Fish	1.25	305.97
Prepared desserts	6.00	339,36
Ice		553.23
Supplies	8.77	1,215.10
Equipment	.64	408.20
Sundries		114.18
Board	2.50	
Total	192.92	21,758.37
ADMINISTRATION AND OFFICE.		
Salaries		7,282.17
Supplies		297.63
Equipment		124.27
Communication service	63.09	660.94
Printing		132.50
ADMINISTRATION AND OFFICE—continued.		
Auditing and account books		$359.06
Sundries		8.52
Total	$63.09	8,865.09
GROUNDS.		
Salaries	5.71	3,555.30
Supplies	11.35	546.30
Equipment		137.34
Teaming		25.84
Board and care of horses		8.50
Sundries	107.55	900.39
Total	124.61	5,173.67
LAUNDRY.		
Salaries		1,354.74
Supplies		275.20
Equipment		21.42
Sundries		14.60
Total		1,665.96

Finances—Continued.

	Receipts.	Expenses.
FARM.[1]		
Salaries		$2,596.34
Feed		3,205.62
Plant and seed		117.06
Supplies	$4.45	232.85
Live stock		409.54
Equipment		527.92
Care of live stock		56.98
Teaming		25.10
Repairs		1,425.71
Milk	1,130.72	
Fruit and vegetables	7.15	
Poultry and eggs	98.61	
Live stock	663.43	
Sundries	99.30	29.62
Total	2,003.66	8,626.74
GALLAUDET COLLEGE.		
Salaries		20,244.59
Library supplies and equipment		397.70
Laboratory supplies and equipment		208.21
Supplies	1.03	377.25
Equipment		365.47
Medical expenses	139.20	1,314.59
Sundries		45.90
Total	140.23	22,953.71
NORMAL DEPARTMENT.		
Salaries		1,625.94
GARAGE.		
Salaries		630.00
Gasoline and oil	.20	280.34
Supplies	3.00	275.25
Equipment		814.68
Repairs		61.07
Sundries		67.20
Total	3.20	2,128.54
IMPROVEMENTS, RENEWALS, AND REPAIRS.		
Salaries		4,655.60
Materials and supplies	9.48	2,613.61
IMPROVEMENTS, RENEWALS, AND REPAIRS—CON.		
Equipment		$44.94
Contracts		1,439.02
Sundries		50.00
Sewer at farm; machinery at shop		2,400.00
Total	$9.48	11,203.17
KENDALL SCHOOL.		
Salaries		9,869.64
Supplies		361.68
Equipment		390.74
Medical expenses		331.96
Sundries	53.96	94.54
Total	53.96	11,048.56
LIGHT, HEAT, AND POWER.		
Salaries		1,769.25
Coal		3,616.15
Gas		1,322.51
Supplies		108.65
Equipment	4.00	132.98
Sundries		21.60
Total	4.00	6,971.14
MISCELLANEOUS.		
Traveling	4.33	460.39
Students' merchandise	654.84	633.32
Presents, subscriptions, and advances	110.00	117.05
United States appropriations	93,203.86	
Tuition, Gallaudet College	1 950.00	
Tuition, Kendall School	4,200.00	100.00
Equipment, produce, and junk sold	643.85	
Sundries	427.97	28.29
Total	101,194.85	1,339.05
Grand total	103,790.00	103 359.94
Cash on hand July 1, 1916	516.54	
Cash on hand June 30, 1917		946.60
	104,306.54	104,306.54

[1] In addition, the housekeeping department received produce, and the grounds service, valued at $5,095.34, as follows: Milk, $3,525.56; meat, $771.87; fruit and vegetables, $173.52; dairy produce, $386.39; teaming, $22; board of horses, $216.

Statement of the treasurer for the fiscal year ending June 30, 1917.

GENERAL FUND.

1916.		
July 1.	By balance	$868.70
	By 2 Chesapeake & Potomac Telephone Co. coupons, at $25	50.00
	By 8 Chesapeake & Ohio Ry. Co. coupons, at $22.50	180.00
	By 2 Riggs Realty Co. coupons, at $12.50	25.00
	By 6 months' interest to Dec. 31, 1916, on balance in Union Trust Co	12.24
	By 6 months' interest to June 30, 1917, on balance in Union Trust Co	13.87
		1,149.81

Dec. 30.	To G. X. McLanahan, bookkeeping expenses, treasurer's office, to Dec. 31, 1916	$50.00
	To Union Trust Co., rent of safe-deposit box to Apr. 16, 1918	4.00
	To Union Trust Co., subscription to United States 3½ per cent war bond, "liberty loan of 1917"	500.00
	To balance	595.81
		1,149.81

MANUAL LABOR FUND.

1916.		
July 1.	By balance	$417.90
	By 8 Southern Ry. Co. coupons, at $25	200.00
	By 2 Chesapeake & Ohio Ry. Co. coupons, at $22.50	45.00
		662.90
Oct. 20.	To Percival Hall, president, salary of instructor in domestic art, 1916–17	360.00
1917.		
June 30.	To balance	302.90
		662.90

MEMORIAL ART FUND.

1916.		
July 1.	By balance	$77.18
	By 3 United States 1898 coupons, at $0.75	2.25
	By 1 Washington Ry. & Electric Co. coupon, at $10	10.00
		89.43
1917.		
June 8.	To Percival Hall, president, subscription toward bronze tablet in memory of Prof. Allan B. Fay	25.00
30.	To balance	64.43
		89.43

Summary of balances, June 30, 1917.

General fund	$595.81
Manual labor fund	302.90
Memorial art fund	64.43
Total	963.14

ESTIMATES FOR THE FISCAL YEAR ENDING JUNE 30, 1919.

The following estimates for the fiscal year to end June 30, 1919, have already been submitted:

For the support of the institution, including salaries and incidental expenses, for books and illustrative apparatus, and for general repairs and improvements, $98,000.

For repairs to the buildings of the institution, including plumbing and steamfitting, and for repairs to pavements within the grounds, $6,000.

The sum of $98,000, which is the total asked for current expenses, is an increase of $9,800 over the amount asked for for the fiscal year to end June 30, 1918.

Eight hundred dollars of this sum is asked to provide for two additional pupils, or a total of 40, from the District of Columbia. As the number of such pupils has already risen as high as 39 for part of the year, and has slowly but steadily increased for a number

of years past, this small increase in appropriation seems very reasonable and necessary.

An increase of $4,000 is needed to provide for well-deserved increases in salaries of employees of the institution receiving $1,800 or less. The regular increase provided for the Government employees during the fiscal year to end June 30, 1918, has not been allowed to the employees of our institution under a recent ruling of the Comptroller of the Treasury. There seems no good reason why the employees of our institution, engaged in occupations similar to those of Government employees and living under the same circumstances, should not need and receive the additional compensation which Congress has agreed is needed by employees of the Government, and it is earnestly hoped that the additional $4,000 asked for for increases in salaries will be granted.

Five thousand dollars has been added to the estimates for current expenses over the preceding year to provide for an addition of approximately 25 students. An increase of 25 in the number of free scholarships available for students in the advanced department is now being asked for from Congress. While the average per capita cost of instructing and maintaining the college students is well over $600 per annum, it is believed that on account of the small increase in overhead expenses attending the addition of 20 to 25 students, the small sum of $5,000 will provide, for the fiscal year to end June 30, 1919, for the absolutely necessary increase of expenses due to such additional students as would enter for the year.

The present number of free scholarships allowed in the advanced department is 100. This number was fixed in June, 1900. Since that time there has been a steady increase in the number of students desiring to enter the collegiate department, and it has been necessary in the past two years to deny the applications of a number of promising and needy students who have not absolutely completed all requirements for admission, but who might have been able to make up their deficiencies and show an excellent record of attainment in studies had it been possible to admit them to the institution.

With the increased accommodations afforded by the new dormitory for women and some additional rooms already provided for the young men, it will be easily possible to accommodate from 20 to 30 more students in the collegiate department than heretofore. Such an increase in the number of free scholarships will add to the usefulness of the institution at a comparatively small expense, and will meet with the approval of everyone interested in furthering the higher education of the deaf.

NEW DORMITORY.

Work on the new dormitory for college women has progressed slowly but steadily during the year. The young women of the college have been accommodated temporarily in the home of the president of the institution, in the home of Prof. Draper, made vacant by his leave of absence, and in several houses occupied by members of the faculty and their families. New quarters for young men of the college were provided in the old museum in College Hall, and temporary arrangements made to house in College Hall a number

of officers and teachers whose quarters were formerly in the young women's dormitory.

All students and officers were thus accommodated on our own grounds, and the $3,000 allowed to provide temporary quarters during the construction of the new dormitory has all been expended in such a way as to take proper care of those connected with the institution, and, at the same time, add to the future convenience and accommodations of the present buildings. While this arrangement has been attended with many difficulties, it has been far better than any attempt to take care of our students and officers outside of our grounds, and the fact that the health of the young women of the college has remained good during the year and that they have all been able to continue their work successfully, proves the wisdom of the arrangement.

MEETINGS OF THE CONVENTION OF AMERICAN INSTRUCTORS OF THE DEAF, AND THE NATIONAL ASSOCIATION OF THE DEAF.

Especially memorable meetings of the convention of American Instructors of the Deaf and of the National Association of the Deaf were held at Hartford, Conn., June 29 to July 7, 1917.

The present year marks the centennial of the founding of the first permanent school for the deaf in this country by Rev. Thomas Hopkins Gallaudet, father of Dr. Edward Miner Gallaudet, first principal of this institution and founder of Gallaudet College. The meeting was held in part in the original school building, erected soon after Thomas Hopkins Gallaudet returned from his successful study of methods of instructing the deaf under the Abbé Sicard at Paris, France.

A large number of teachers of the deaf representing nearly all States of the Union and Canada attended the meeting. Dr. Edward Miner Gallaudet was president of the convention, and the president of the institution, as vice president of the convention, had charge of the program. Prof. Herbert E. Day was elected assistant secretary of the meeting.

Many valuable papers dealing with the education of the deaf were read. Miss Sarah Harvey Porter had charge of the normal section, and Dr. Charles R. Ely, of the college faculty, presented a paper on "Gallaudet College and vocational training."

There were present from the faculty of Gallaudet College, President Hall, Dr. Fay, Dr. Ely, Dr. Hotchkiss, Dr. Draper, Prof. Day, Miss Peet, Miss Porter, Mr. Drake, Mr. Hughes, and Mr. Fusfeld; and from the faculty of the Kendall School, Mr. Steed, Miss Fay, Miss Marbut, Miss Ely, and Miss Williams.

The alumni of the college held a regular meeting and carried out an interesting program at the same time that the meetings of the convention were held.

Following the meeting of the convention of American Instructors of the Deaf, there occurred what was probably the largest gathering of educated deaf people in the country at the regular meeting of the National Association of the Deaf.

Over a thousand deaf people from all parts of the country gathered to express their appreciation of the life and work of Rev. Thomas

Hopkins Gallaudet and to pay tributes to his memory. They advocated strongly during their discussions the continuation of a broad-minded policy and freedom of methods in the education of the deaf. The meeting was made still more memorable by the tributes paid by a delegation of four educated deaf Frenchmen, who made the journey to this country at great hazard, in order to join in the celebration. These delegates, M. Henri Gaillard and M. Eugene Graff, of Paris; M. Jean Olivier, of Reims; and M. Edmond Pilet, of Rouen, visited a number of points of interest in the United States, including our institution, before returning to France.

On July Fourth the organization of teachers, the alumni of the college, and the National Association of the Deaf, united in special services in honor of Thomas Hopkins Gallaudet. Dr. Edward Allen Fay, vice president of the college, was chosen to speak for the convention of American Instructors of the Deaf.

EXERCISES OF PRESENTATION DAY.

The fifty-third public anniversary of the collegiate department was held in the college chapel on Wednesday, May 2. Rev. H. E. Brundage, of the Eckington Presbyterian Church, offered the opening prayer.

Orations given by members of the graduating class were as follows:

A Brief Study of the Development of Chemistry, Foster Dowrey Gilbert, of Colorado.
The Shenandoah Valley, Charles Jensen Schmidt, of Iowa.
Life in the Cotton Fields, Lilly Alberta Gwin, of Mississippi.

Candidates for degrees were presented by Vice President Fay, Dr. Charles R. Ely, and President Hall, as follows:

For the degree of bachelor of pedagogy.

NORMAL FELLOWS.

Grace Decker Coleman, B. A., Greenville Woman's College, South Carolina.
Urath Dorsey McCall, B. A., Synodical College, Missouri.
Herschel Rodgers Ward, B. A., Mississippi College, Mississippi.

For normal student's diploma.

John Keble Cloud, Smith Academy, Missouri.
Elizabeth Burhow Thompson, Council Bluffs High School, Iowa.

For the degree of bachelor of science.

Foster Dowrey Gilbert.

For the degree of bachelor of philosophy.

Ellen Anna Pearson. Henry Jeremiah Pulver.
James Alvin Sullivan.

For the degree of bachelor of letters.

Charles Clyde Marshall. Narcissa Irwin Watts.

For the degree of bachelor of arts.

LeRoy Julius Davis. Flossie Adria Hoisington.
Lilly Alberta Gwin. Oliver Winning McInturff.
Charles Jensen Schmidt.

A recitation in the sign language of the Star Spangled Banner was given by Miss Marguerite Kau, of Oregon, a student in the college.

Dr. Merrill E. Gates, of Washington, addressed the graduating class.

The benediction was pronounced by Rev. Arthur D. Bryant, Baptist minister to the deaf, Washington.

CONFERRING OF DEGREES.

On the closing day of the term, June 20, 1917, degrees and certificates were conferred in accordance with the recommendations of presentation day, with two exceptions.

Messrs. James Alvin Sullivan and Henry Jeremiah Pulver, having made up their deficiencies and thus completed all requirements for graduation, were each given the degree of bachelor of arts.

All of which is respectfully submitted.

PERCIVAL HALL, *President.*

The SECRETARY OF THE INTERIOR.

APPENDIX A.

FACULTY OF GALLAUDET COLLEGE, 1917–18.

Emeritus president and professor of moral and political science.—Edward Miner Gallaudet,[1] Ph. D., LL. D.

President and professor of applied mathematics and pedagogy.—Percival Hall, M. A., Litt. D.

Vice president and professor of languages.—Edward Allen Fay, M. A., Ph. D., Sc. D., Litt. D.

Professor of English and history.—John Burton Hotchkiss, M. A., Litt. D.

Professor of mathematics and Latin.—Amos G. Draper, M. A., Litt. D.[2]

Professor of natural science.—Charles Russell Ely, M. A., Ph. D.

Professor of English and Biology.—Herbert E. Day, M. A.

Professor of mathematics and engineering.—Isaac Allison, E. E.

Assistant professor of Latin and in charge of the college women.—Elizabeth Peet.

Librarian and instructor in English and mathematics.—Helen Northrop, B. A.

Instructor in Latin and natural science.—Victor O. Skyberg, M. A.

Instructor in mathematics and physical director.—Frederick H. Hughes, M. A.

Instructor in Agriculture.—Harley D. Drake, B. A., M. S.

Emeritus instructor in drawing.—Arthur D. Bryant, B. Ph.

Instructor in English and history.—Irving S. Fusfeld, B. S., B. Ped., M. A.

Instructor in applied art and drawing.—Charlotte E. Weiss.

Instructor in gymnastics.—Helen Devreaux.

Instructor in printing.—Altamont M. Rogers.

DEPARTMENT OF ARTICULATION AND NORMAL INSTRUCTION, 1917–18.

In charge.—Percival Hall, M. A., Litt. D.

Instructors.—Lyman Steed, M. A.; Annie E. Jameson; Sarah H. Porter, M. A.

Normal fellow.—S. T. Anderson, B. A., Loyola College, Illinois.

Normal students.—Helen Bailey, B. A., Mitchell College, North Carolina; Dorothy Long, Council Bluffs High School, Iowa; Miriam Michaels, Fort Smith, Ark.

FACULTY OF THE KENDALL SCHOOL, 1917–18.

President.—Percival Hall, M. A., Litt. D.

Principal.—Lyman Steed, M. A.

Instructors.—Helen Fay; Musa Marbut, M. A.; Grace D. Ely; Elizabeth Thompson; Lilly Gwin, B. A.

Instructor in art and manual training.—Margaret Wafter.

Instructor in sewing and cooking.—Agnes Suman.

DOMESTIC DEPARTMENT, 1917–18.

Supervisor and disbursing agent.—Louis L. Hooper, M. A.

Attending physician.—Harry H. Donnally, M. D.

Dentist.—J. A. Taylor, D. D. S.

Matron, Gallaudet College.—Mrs. Cora V. Troup.

Girls' matron, Kendall School.—Mrs. Edith Reese.

Boys' Matron, Kendall School.—Mrs. Carrie R. Timberlake.

Girls' supervisor.—Jennie Kennedy.

Boys' supervisor.—Guilbert Braddock.

Master of shop.—Norman Herrington.

Gardener.—Edward Mangum.

Farmer.—Harley D. Drake, B. A., M. S.

Chief engineer.—William J. Muir.

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[1] Died Sept. 26, 1917.

[2] On leave of absence.

APPENDIX B.

CATALOGUE OF STUDENTS AND PUPILS, BY STATES.

IN THE COLLEGE.

Alabama:
Harper, Florence.
Rhodes, Luther.
Arkansas:
Wallace, Mamie.
California:
Guire, Oscar.
Peterson, Lewis.
Valiant, Walter.
Whitworth, George.
Colorado:
Barnett, Vern.
Braddock, Guilbert.
Frewing, Robert.
Gilbert, Foster.
Lawver, Esther.
Matthew, Tom.
Studt, Ada.
Wilson, Powell.
Connecticut:
Bouchard, Joseph.
Lewis, Florence.
Shahinion, Marie.[1]
Sullivan, James.
District of Columbia:
Lynch, Ulen.
McAvoy, Monica.
Florida:
Austin, Henry.
Townsend, William.
Illinois:
Burns, Robey.
Eskew, William.[1]
Peard, Forrest.
Indiana:
Schowe, Ben.
Iowa:
Dobson, Everett.
Jung, Evelyn.[1]
Marty, John.[1]
Pearson, Mabel.
Rebal, Frank.
Schmidt, Charles.
Waggoner, Mildred.[1]
Kansas:
Atkins, Ruth.
Davis, Le Roy.
Dohrmann, Frank.
Ferguson, Gerald.
Houze, Clyde.
Linton, Pearl.[1]
Paxton, Lawrence.
Smith, Harley.
Stewart, George.[1]
Wolverton, Jean.[1]
Kentucky:
Hertzman, Roy.
Kannapell, George.
Tuck, Sara.[1]
Louisiana:
Courrege, Armand.
Maine:
Eustis, Augusta.
Wadlin, Ernest.
Maryland:
Hetzler, Wroth.
Moss, Elizabeth.
Prediger, Harry.
Weinstein, Jacob.
Winterling, Esther.[1]
Massachusetts:
Cohen, Blume.
Michigan:
Earle, Richard.[1]
Maczkowski, Earl.[1]
Minnesota:
Earsley, Etta.[1]
Koenig, Theresa.
Lauritsen, Wesley.[1]
Post, Eunice.
Rosen, Alex.
Weirner, Maurice.[1]
Mississippi:
Gwin, Lilly.
Hume, Boyd D.[1]
McMullan, Frank H.[1]
Netterville, Irvin.
Missouri:
Armstrong, Eugene.
Toner, Isabelle.
Wear, Carl.
Wolf, Caroline.
Montana:
Cole, Julia.
Gibson, Wallace.
Preston, Glenn.
Nebraska:
Cowen, Ella.
Marshall, Charles.
Maxwell, Estella.
Olson, Regina.
Pearson, Ellen.
Weseen, Effie.
New Jersey:
Dobbins, Charles.
New York:
Lewis, Gertrude.[1]
May, William.[1]
Pulver, Henry.
Rozboril, Matthew.
Tredwell, Sara.

[1] Admitted for the school year 1917–18.

North Carolina:
- Calhoun, James.[1]
- Coltrane, Pearl.[1]
- Hardin, Alice.
- Kirby, Ruth.[1]
- Pike, Hazel.[1]
- West, Julian.[1]

North Dakota:
- Billigmeier, Herbert.
- Clark, Glen.[1]
- Francis, Doris.
- Haley, Wendell.
- Heupel, Philip.
- Knutson, Alfred.
- Schlenker, Emil.

Ohio:
- Bennett, Merritt.
- Conarroe, Grace.
- Jones, Helen.
- Lindsey, Nellie.
- Myers, Veda.
- Pilliod, Norbert.

Oklahoma:
- Harold, Ethel.
- Logan, Mary.[1]
- McDaniel, Mabel.[1]
- Wilcoxson, Ella.[1]

Oregon:
- Dodd, Julia.[1]
- Kau, Marguerite.
- Walker, Clyde.

Pennsylvania:
- Bates, Gladys.
- Davies, George.
- Flenner, Miriam.[1]
- Goldstein, Jacob.
- Harmon, Edward.
- Pennell, Mary.
- Sterck, Emily.
- Stilwell, Helen.[1]

South Carolina:
- Boatwright, Sophie.
- Hartin, Archie.[1]
- Pridmore, Carl.[1]

South Dakota:
- Hoisington, Flossie.
- Hunt, Helen.[1]
- Jungwirth, Annie.
- Sloan, Ollie.

Tennessee:
- Osborne, Thomas.
- Ozier, Claude.
- Shawl, Arthur.[1]

Texas:
- Capps, W. J.
- Gerber, Leoma.
- Hill, Troy.
- Stevens, Kelly.

Utah:
- Hitesman, Cora.
- Hunter, Maree.
- Wenger, Arthur.
- Wenger, Ray.

Virginia:
- McInturff, Oliver.

Washington:
- Deer, Dewey.[1]
- Loveall, Mary.
- McNeal, Edwin.[1]
- Sanders, Oscar.[1]
- Steuernagel, Letha.[1]
- Willman, Kenneth.

West Virginia:
- Watts, Lula.
- Watts, Narcissa.

Wisconsin:
- Brandl, Joseph.[1]
- Conover, Dorothy.
- Hansmann, Meta.[1]
- Jensen, Tilla.[1]
- Kallenbach, Mary.

IN THE KENDALL SCHOOL.

Alberta, Canada:
- Rosenroll, Richelda.

Delaware:
- Ellingsworth, Ida.
- Johnston, Robert.
- Lynch, Edward.
- McCabe, Ella.
- Peterson, Olivia.
- Roberts, Pearl.
- Sines, Mabel.

District of Columbia:
- Ball, Annie.
- Berman, Frank.
- Boisseau, Sue.
- Bostwick, Mabel.
- Cicchino, Tony.
- Cissel, William.
- Cooper, Albin.
- Covington, Alice.
- Craven, Jack.
- Culverwell, Esther.
- Curtis, Raymond.[1]

District of Columbia—Continued.
- Dolan, James.
- Dunn, Delma.
- Esterly, Guy.
- Flaccomio, Benedetta.
- Furr, Annie.
- Goetz, Frances.
- Higgins, Thelma.[1]
- Hill, Frederick.
- Hutchins, Elsie.
- Looney, Thomas.
- Miller, John.
- Miller, Frances.
- Miller, Mildred.
- Minter, Leonidas.
- Moore, Agnes.
- Moore, Cecil.
- Neitzey, Annie.
- Norcia, Rosie.
- O'Neil, Virgie.
- Panholzer, Mary.
- Pearson, Pearl.

[1] Admitted for the school year 1917–18.

District of Columbia—Continued.
Pucci, Luiggi.
Reed, Florence.
Ridgeway, Francis.
Rowzee, Reuben.
Scott, Carlisle.
Sullivan, Charles.
Thompson, Philip.
Werdig, Robert.
Wheeler, Clara.
Wuerdemann, John.[1]

Manitoba, Canada:
McShane, Muriel.[1]
Nicholson, Ethelwynne.

Maryland:
Bowen, Clyde.

Ohio:
Krohngold, Walter.

Pennsylvania:
Cusack, Daniel.

Tennessee:
Lucado, Prentis.[1]
Rittenberg, Sam.[1]
Sellers, Andrew.[1]
Shawl, Arthur.

West Virginia:
MacVeigh, Helen Louise.[1]
Schultz, Raymond.[1]
Smith, Kathleen.[1]

[1] Admitted for the school year 1917–18.

APPENDIX C.

REGULATIONS.

1. The academic year is divided into three terms, the first beginning on the last Thursday in September and closing on the 24th of December; the second beginning the 29th of December and closing the next to the last Friday in March; the third beginning the following Monday and closing the Wednesday before the last Wednesday in June.

2. The vacation is from the Wednesday before the last Wednesday in June to the last Thursday in September.

3. There are holidays at Thanksgiving, Christmas, Washington's Birthday, Easter, and Decoration Day.

4. Pupils may visit their homes during the regular vacation and on the above-named holidays, but at no other time unless for some special urgent reason, and then only by permission of the president.

5. The bills for the maintenance and tuition of pupils supported by their friends must be paid semiannually in advance.

6. The charge for pay pupils is $350 per annum. This sum covers all expenses in the primary department except clothing and extraordinary medical attention, and all in the college except clothing, books, and extraordinary medical attention.

7. All deaf-mutes of teachable age, of good mental capacity, and properly belonging to the District of Columbia are received without charge. To students from the States and Territories who have not the means of defraying all the expenses of the college course the board of directors renders such assistance as circumstances seem to require, so far as the means at its disposal will allow.

8. It is expected that the friends of the pupils will provide them with clothing, and it is important that upon entering or returning to the institution they should be supplied with a sufficient amount for an entire year. All clothing should be plainly marked with the owner's name.

9. All letters concerning pupils or applications for admission should be addressed to the president.

10. The institution is open to visitors during term time on Thursdays only, between the hours of 9 a. m. and 3 p. m. Visitors are admitted to chapel service on Sunday afternoons at 5 o'clock.

REPORT OF THE FREEDMEN'S HOSPITAL.

ROSTER OF OFFICERS.

STAFF.

W. A. Warfield, M. D., *Surgeon in Chief.*
S. L. Carson, M. D., *Assistant Surgeon.*
C. A. Brooks, M. D., *Resident Physician.*
Walter Van Swearingen, M. D., *Pathologist.*
T. E. Jones, M. D., *Anæsthetist.*

NURSES.

Laura R. MacHale, Registered Nurse, New Jersey, *Superintendent.*
Emma M. Irwin, Registered Nurse, Illinois, *Assistant Superintendent.*
Martha E. Cabaniss, Registered Nurse, Virginia, *Night Supervisor.*
Lulu E. Thompson, Head Nurse.
M. M. York, Head Nurse.
Bertha J. Thomas, Head Nurse.

CLERK AND ASSISTANTS.

F. D. Henry, U. S Garnes (stenographer), W. E. Cobb.

INTERNES.

L. A. Gibson, M. D.
C. J. Young, M. D.
J. H. McMorries, M. D.
M. L. Crawford, M. D.
N. W. Harris, M. D.
E. H. Lee, M. D.
William E. Davis, *Pharmacist.*
Moses Clayborne, M. D.
B. P. Hurst, M. D.
W. M. Lane, M. D.
C. A. Mellon, M. D.
J. L. Wilson, M. D.
A. M. Yancey, *Assistant Pharmacist.*

ADVISORY VISITING STAFF.

Edward A. Balloch, M. D.
Edward D. Williston, M. D.
J. E. H. Taylor, M. D.
Wm. F. Sowers, M. D.
Wm. A. Jack, M. D.
Jas. J. Richardson, M. D.
J. B. Nichols, M. D.

VISITING STAFF.

INDOOR.

Medical.

Henry P. Parker, M. D.
Caryl Burbank, M. D.
Thomas Martin, M. D.
Robert W. Brown, M. D.
J. B. Nichols, M. D.
E. H. Reede, M. D.
Lewis Ecker, M. D.
Assistant: E. J. Watson, M. D.

Surgical.

E. A. Balloch, M. D.
Wm. F. Sowers, M. D.
Wm. A. Jack, M. D.
H. H. Kerr, M. D.
A. M. Curtis, M. D.

Assistants: P. M. Murray, M. D.; J. E. H. Taylor, M. D.; A. L. Curtis, M. D.; B. P. Hurst, M. D.

Gynecological.

W. A. Warfield, M. D.
Wm. C. McNeill, M. D.
Howard Hume, M. D.
J. E. H. Taylor, M. D.
H. W. Lawson, M. D.

Assistants: S. L. Cook, M. D.; H. R. Burwell, M. D.; J. W. Ross, M. D.; N. W. Harris, M. D.

Obstetrical.

Edward D. Williston, M. D.
H. F. Kane, M. D.
H. W. Freeman, M. D.

Ophthalmological.

James C. Dowling, M. D. Assistant: E. A. Robinson, M. D.

Otology and Rhinology.

Jas. J. Richardson, M. D. Assistant: Hamilton S. Martin, M. D.

Neurology.

Tom A. Williams, M. D. Assisstants: E. C. A. Wilson, M. D.; E. G. Mitchell, M. D.; Harry A. Bishop, M. D.

Genito-Urinary.

H. A. Fowler, M. D. Assistants: Milton A. Francis, M. D.; R. Arthur Hooe, M. D.

Orthopedics.

Wm. G. Erving, M. D.; John Dunlop, M. D. Assistant: Chas. A. Allen, M. D.

Pediatrics.

Wm. J. French, M. D.; E. H. Reede, M. D.; E. P. Copeland, M. D. Assistant: A. B. McKinney, M. D.

Dental Surgeons.

Geo. H. Butcher, D. D. S.; F. P. V. Barrier, D. D. S.

OUTDOOR.

Medical.

W. E. Lewis, M. D.
U. J. Daniels, M. D.
C. A. Tignor, M. D.
J. F. Dyer, M. D.
E. J. Watson, M. D.
E. De J. McSween, M. D.
Lee A. Gill, M. D.
W. F. Phillips, M. D.
F. D. Whitby, M. D.

Minor Surgery.

Wm. A. Jack, M. D.; C. W. Childs, M. D.; A. L. Curtis, M. D.

Ophthalmological.

James C. Dowling, M. D. Assistants: E. C. A. Wilson, M. D.; E. A. Robinson, M. D.

Otology and Rhinology.

Jas. J. Richardson, M. D. Assistants: Hamilton S. Martin, M. D.; U. L. Houston, M. D.

Neurology.

Tom A. Williams, M. D. Assistants: E. C. A. Wilson, M. D.; E. G. Mitchell, M. D.; Harry A. Bishop, M. D.

Genito-Urinary.

H. A. Fowler, M. D. Assistants: Milton A. Francis, M. D.; Ivy Albert Pelzman, M.D.; R. Arthur Hooe, M. D.

Gynecology.

Wm. C. McNeill, M. D. Assistants: Chas. H. Marshall, M. D.; H. R. Burwell, M. D., C. J. Young, M. D.

Orthopedics.

Wm. G. Erving, M. D.; John Dunlop, M. D. Assistant: Chas. A. Allen, M. D.

Pediatrics.

John W. Mitchell, M. D.; Marie B. Lucas, M. D.

Dermatology.

H. H. Hazen, M. D. Assistants: C. C. Lathers, M. D.; Paul Zinkham, M. D.

Tuberculosis.

James T. Blue, M. D.

REPORT OF THE FREEDMEN'S HOSPITAL.

WASHINGTON, D. C., *August 23, 1917.*

SIR: I have the honor to submit for your consideration, the annual report of the Freedmen's Hospital for the fiscal year ended June 30, 1917.

The period covered by this report was the busiest in the history of this institution. In every department, there was an increase in the amount of work as compared with the preceding year; with results, on the whole, pleasing. It is believed, however, that the efficiency of the service would be enhanced if the nursing force could be enlarged. In the care of the sick, it is unquestionably the part of wisdom to preserve the health of the nurse. This end is attained in large measure by providing a sufficient number of nurses so as to make it impossible for any one to be overworked.

The efficiency of the service was also endangered because the appropriation for the support of the hospital was insufficient for all demands. This situation was due to the increased number of patients treated and the unusual high cost of practically all articles used. In many instances, the prices were prohibitive. This was particularly true with drugs and chemicals.

It will be exceedingly difficult, if not impossible, to maintain proper standards of efficiency, both in the care of patients and in the sanitary conditions of the hospital, during the current fiscal year unless sufficient funds are provided therefor. Moreover, a lack of appropriation hampers further development of the hospital and denies the community a full measure of its usefulness.

PATIENTS.

There were 3,886 patients, including 360 births, admitted into the hospital during the year. These, with 215 remaining from the preceding year, made a total of 4,101 indoor patients under care as against 3,672 last fiscal year.

Of the number admitted, including 163 births, 1,828 were indigent residents of the District of Columbia, 1,683, including 161 births, were indigent residents of the States, and 375, including 36 births, were pay patients.

There were discharged during the year 3,856. Of which number 1,993 had recovered, 1,274 improved, 242 unimproved, 35 not treated, and 312 died, leaving 245 in the hospital at the close of the year. Of this number 16 were pay patients, 147 United States indigents, and 82 District of Columbia indigents.

The mortality rate from all causes was 7.64 per cent, a slight increase over the preceding year. This is due to the admission of a greater number of moribund cases.

Three thousand seventy-seven surgical operations were performed, with a death rate of 2.1, the same as last year.

In the out-patient department 8,676 were treated as follows: Medical, 2,496; gynecological, 777; ear, nose, and throat, 1,050; eye, 1,267; pediatrics, 1,027; dermatology, 550; orthopedic, 265; neurology, 177; minor surgery, 418; genito-urinary, 590; and tuberculosis, 59.

There were 14,858 revisits made by the patients attending the several divisions of this department. Of which number 2,971 were for surgical dressings.

Patients admitted each year for the past 43 years.

Year ending June 30—		Year ending June 30—		Year ending June 30—	
1875	190	1889	2,074	1903	2,677
1876	319	1890	2,392	1904	2,907
1877	500	1891	2,373	1905	2,918
1878	519	1892	2,331	1906	2,207
1879	642	1893	2,422	1907	2,366
1880	819	1894	2,801	1908	2,669
1881	892	1895	2,476	1909	2,590
1882	1,102	1896	2,596	1910	2,740
1883	1,373	1897	2,815	1911	2,900
1884	1,509	1898	2,355	1912	3,385
1885	1,794	1899	2,374	1913	3,208
1886	1,923	1900	2,427	1914	3,144
1887	2,017	1901	2,414	1915	3,348
1888	1,997	1902	2,408	1916	3,491
				1917	3,886

STATISTICAL TABLES.

INDOOR SERVICE.

The following tables show in classified detail the number of medical and surgical cases treated, discharges, operations, results, and other important statistical data of the indoor patients:

Medical and surgical diseases, except pay patients.

Disease.	Remaining July 1, 1916.	Admitted.					Discharged.						Total number of days in hospital.	Average number of days in hospital.	Remaining July 1, 1917.
		White.		Colored.			Recovered.	Improved.	Unimproved.	Not treated.	Dead.	Total.			
		Male.	Female.	Male.	Female.	Total.									
Abscesses, infections, ulcers.															
Abscess:															
Alveolus	....	....	...	2	2	5	2	2	....	....	....	4	64	16	1
Breast	....	....	...	.....	2	2	.....	1	1	....	....	2	20	10	....
Chest wall	....	....	...	4	.....	4	1	2	....	....	....	3	107	35.6	1
Ischio-rectal	....	....	...	6	9	15	6	5	1	....	....	12	266	22.1	3
Leg	....	....	...	4	.....	4	1	3	....	....	....	4	81	20.2	....
Lung	....	....	...	1	1	2	.....	2	....	....	....	2	159	79.5	....
Perinephritic	....	....	...	1	.....	1	.....	1	....	....	....	1	62	62	....
Peritonsillar	....	....	...	3	3	6	3	2	1	....	....	6	44	7.3	....
Periurethral	....	....	...	6	1	7	3	4	....	....	....	7	195	2.8	....
Subdiaphragmatic	....	....	...	1	.....	1	1	.....	....	....	....	1	89	89	....
Valvo-vaginal	....	....	...	.....	3	3	2	1	....	....	....	3	18	6	....
Infections:															
Breast	....	....	...	.....	3	3	1	2	....	....	....	3	68	22.6	....
Foot	....	....	...	3	.....	3	.....	3	....	....	....	3	31	10.3	....
Frontal sinus	....	....	...	1	4	5	1	2	1	....	1	5	106	21.2	....
Hand	1	....	...	11	2	14	3	9	....	....	1	13	261	20	1
Leg	....	....	...	1	.....	1	1	.....	....	....	....	1	10	10	....
Scalp	2	....	...	4	1	7	3	2	....	....	1	6	201	33.5	....
Scrotum	....	....	...	1	.....	1	.....	.....	....	....	1	1	6	6	....
Ulcer:															
Abdominal wall	....	....	...	3	.....	3	1	2	....	....	....	3	36	12	....
Duodenum	....	....	...	2	2	4	1	3	....	....	....	4	91	22.7	....
Ileum	....	....	...	1	.....	1	.....	1	....	....	....	1	21	21	....
Leg	1	....	1	5	11	18	7	9	....	....	....	16	1,048	65.5	2
Lip	....	....	...	.....	1	1	.....	1	....	....	....	1	15	15	....
Rectum	....	....	...	1	1	2	.....	.....	2	....	....	2	11	5.5	....
Stomach	2	....	...	3	4	9	2	6	....	....	1	9	248	27.5	....
Bones and joints.															
Ankylosis:															
Elbow	....	....	...	1	.....	1	.....	.....	1	....	....	1	5	5	....
Hip	....	....	...	2	.....	2	.....	1	....	....	....	1	16	16	1
Knee	....	....	...	1	1	2	.....	1	....	....	....	1	5	5	1
Shoulder	1	1	...	.....	.....	2	.....	2	....	....	....	2	21	105	....
Arthritis:															
Gonorrheal	....	....	...	5	.....	5	1	3	1	....	....	5	168	33.6	....
Infectious	1	1	...	19	12	33	2	20	3	....	1	26	1,153	44	7
Tubercular—															
Elbow	1	....	...	1	.....	2	.....	2	....	....	....	2	440	220	....
Hip	1	....	...	.....	4	5	.....	5	....	....	....	5	59	11.8	....
Knee	3	1	...	4	1	9	.....	6	1	....	1	8	651	81.3	1
Spine	1	....	...	9	7	17	2	10	2	....	1	15	1,103	73	2
Cyst of femur	....	....	...	.....	1	1	.....	1	....	....	....	1	43	43	....
Deformities—															
Genu valgus	2	....	...	1	.....	3	1	2	....	....	....	3	249	83	....
Hallus valgus	....	....	...	1	.....	1	1	.....	....	....	....	1	11	11	....
Scoliosis	....	....	...	.....	1	1	.....	1	....	....	....	1	14	14	....
Talipes	3	....	...	4	2	9	1	8	....	....	....	9	1,024	113	....
Dentigerous cyst	....	....	...	.....	1	1	.....	1	....	....	....	1	29	29	....
Dislocations:															
Femur	....	....	...	1	1	2	.....	1	....	....	....	1	11	11	1
Humerus	....	....	...	2	1	3	1	2	....	....	....	3	14	4.6	....
Maxilla, inferior	....	....	...	1	.....	1	.....	.....	1	....	....	1	1	1	....
Semilunar cartilage	....	....	...	1	1	2	2	.....	....	....	....	2	20	10	....
Vertebra	....	....	...	2	.....	2	.....	1	1	....	....	2	217	108.5	....
Fracture:															
Clavicle	....	....	...	1	.....	1	.....	1	....	....	....	1	12	12	....
Femur	2	....	...	8	3	13	5	4	2	....	....	11	725	66	2
Fibula	....	....	...	1	2	3	1	2	....	....	....	3	44	14.6	....
Fibula and tibia	2	....	...	2	3	7	1	3	1	....	1	6	374	62.3	1
Humerus	2	....	...	10	3	15	7	6	....	....	....	13	428	32.9	2
Maxilla	....	....	...	9	.....	9	1	7	....	....	....	8	158	197	1
Metacarpal	....	....	...	1	.....	1	.....	1	....	....	....	1	1	1	....
Metatarsal	1	....	...	2	.....	3	.....	3	....	....	....	3	34	11.3	....
Radius	....	2	...	4	4	10	1	9	....	....	....	10	63	6.3	....
Ribs	....	1	...	2	2	5	.....	4	....	....	....	4	25	6.2	....
Skull	....	....	...	3	.....	3	.....	.....	....	....	2	2	5	2.5	1
Tibia	2	1	...	5	3	11	4	7	....	....	....	11	59.1	53.7	1
Ingrown toenail	....	....	...	1	2	3	.....	3	....	....	....	3	21	7	....

Medical and surgical diseases, except pay patients—Continued.

Disease.	Remaining July 1, 1916.	Admitted.					Discharged.						Total number of days in hospital.	Average number of days in hospital.	Remaining July 1, 1917.
		White.		Colored.											
		Male.	Female.	Male.	Female.	Total.	Recovered.	Improved.	Unimproved.	Not treated.	Dead.	Total.			
Bones and joints—Con.															
Osteomyelitis:															
Carpus	.....	....	1	1	.....	2	1	1	....	....	....	2	15	7.5	....
Femur	1	....	....	.....	1	2	.....	1	....	....	....	1	91	91	1
Humerus	.....	....	....	.....	1	1	.....	1	....	....	....	1	125	125	....
Mandible	1	....	....	1	6	8	.....	7	....	....	....	7	160	22.8	1
Olecranon	.....	1	....	.....	.....	1	.....	1	....	....	....	1	4	4	....
Os calcis	.....	....	1	.....	.....	1	.....	1	....	....	....	1	111	111	....
Tarsus	1	....	....	.....	.....	1	1	.....	....	....	....	1	107	107	....
Tibia	.....	....	....	4	5	9	2	5	....	....	....	7	345	49.2	2
Periostitis	1	....	....	5	1	7	.....	5	2	....	....	7	52	7.4	....
Sprain:															
Ankle	.....	1	....	8	3	12	4	8	....	....	....	12	117	9.7	....
Knee	.....	....	....	1	.....	1	.....	1	....	....	....	1	6	6	....
Sacro-iliac	1	....	....	11	6	18	2	13	1	....	....	16	376	23.5	2
Wrist	.....	....	....	1	.....	1	.....	1	....	....	....	1	2	2	....
Synovitis	1	....	....	6	4	11	2	9	....	....	....	11	166	15	....
Circulatory system.															
Aneurysm	1	....	....	9	4	14	1	4	4	....	5	14	372	264	....
Acute dilatation, heart	.....	....	....	.....	3	3	.....	.....	....	....	3	3	3	1	....
Angina pectoris	.....	1	....	.....	.....	1	.....	1	....	....	....	1	1	1	....
Cerebral hemorrhage	3	....	....	4	2	9	.....	3	....	....	4	7	173	24.7	2
Epistaxis	.....	....	....	1	1	2	1	1	....	....	....	2	17	8.5	....
Frostbite	.....	....	....	1	1	2	.....	1	1	....	....	2	50	25	....
Gangrene, foot	.....	....	....	9	6	15	4	4	1	....	4	13	708	57	2
Hemorrhoids	1	....	....	25	5	31	26	3	1	....	....	30	149	4.9	1
Internal hemorrhage	.....	....	....	1	.....	1	.....	.....	....	....	1	1	1	1	....
Myocarditis	.....	....	....	9	1	10	.....	6	1	....	3	10	270	27	....
Pericarditis	.....	....	....	4	2	6	1	4	....	....	1	6	176	293	....
Sclerosis, arteries	1	....	....	7	4	12	.....	5	2	....	5	12	272	22.6	....
Valvular diseases:															
Insufficiency—															
Aortic	.....	....	....	10	3	13	.....	9	1	....	3	13	621	47.7	....
Mitral	8	....	....	27	16	51	.....	33	1	....	13	47	2,067	49	4
Stenosis, mitral	2	....	....	.....	.....	2	.....	1	....	....	1	2	48	24	....
Varicose veins	1	....	....	1	.....	2	1	1	....	....	....	2	196	98	....
Constitutional diseases.															
Anemia	1	....	....	1	1	3	.....	2	1	....	....	3	60	20	....
Diabetes mellitus	.....	....	....	1	4	5	.....	3	....	....	2	5	120	24	....
Marasmus	1	....	....	8	9	18	1	7	....	....	8	16	580	36.2	2
Obesity	.....	....	....	.....	1	1	.....	1	....	....	....	1	17	17	....
Rickets	1	....	....	6	3	10	.....	3	2	....	5	10	269	26.9	....
Digestive organs.															
Acute dilatation, stomach	.....	....	....	2	.....	2	1	1	....	....	....	2	5	2.5	....
Appendicitis:															
Acute	2	....	....	19	12	33	23	4	1	....	3	31	728	23.4	2
Chronic	1	....	....	19	22	42	30	7	4	....	1	42	919	21.8	....
Constipation	.....	....	....	7	10	17	7	10	....	....	....	17	177	10	....
Enteritis	1	....	....	15	15	31	11	8	3	....	5	27	568	21	4
Enteroptosis	.....	....	....	.....	1	1	.....	1	....	....	....	1	9	9	....
Fissure in ano	1	....	....	2	2	5	2	3	....	....	....	5	84	16.8	....
Fistula in ano	.....	....	....	5	6	11	6	1	....	....	....	7	140	20	4
Hernia:															
Epigastric	.....	....	....	2	.....	2	1	1	....	....	....	2	56	28	....
Femoral	.....	....	....	.....	1	1	1	.....	....	....	....	1	20	20	....
Incisional	.....	....	....	1	7	8	7	.....	....	....	1	8	174	21.7	....
Inguinal	4	3	....	64	8	79	62	8	4	....	3	77	1,950	25	2
Umbilical	.....	....	....	2	5	7	7	.....	....	....	....	7	148	21	....
Intestinal obstruction	.....	1	....	1	4	6	1	1	....	....	4	6	38	6.3	....
Lues:															
Cholelithiasis	.....	....	....	2	7	9	3	4	1	....	1	9	198	22	....
Cholecystitis	1	....	....	1	4	6	1	4	1	....	....	6	262	43.6	....
Cirrhosis	.....	....	....	5	1	6	.....	5	....	....	1	6	211	35	....
Icterus neonatorum	.....	....	....	.....	2	2	.....	.....	....	....	....	.....	.....	.....	2

Medical and surgical diseases, except pay patients—Continued.

Disease.	Remaining July 1, 1916.	Admitted.					Discharged.						Total number of days in hospital.	Average number of days in hospital.	Remaining July 1, 1917.
		White.		Colored.			Recovered.	Improved.	Unimproved.	Not treated.	Dead.	Total.			
		Male.	Female.	Male.	Female.	Total.									
Digestive organs—Con.															
Oesophageal stricture				1	1	2		1			1	2	7	3.5	
Post operative adhesions	1			1		2	2					2	59	29.5	
Pyloric stenosis				1		1		1				1	29	29	
Rectal polypi					1	1		1				1	16	16	
Rectal stricture	1			1	9	11	2	8	1			11	259	23.5	
Stomach:															
Gastritis—															
Acute				9	11	20	5	12				17	96	5.6	3
Chronic				5	3	8		7			1	8	101	12.6	
Eye.															
Cataract	3			2	7	12		10	1			11	555	50.4	1
Conjunctivitis				1	2	3	2		1			3	45	15	
Chalazion					1	1	1					1	16	16	
Corneal ulcer	1			3		4		4				4	201	50.2	
Glaucoma	1			2	3	6	1	5				6	298	49.6	
Iridocyclitis				1	2	3	1	1	1			3	73	24.3	
Iritis	2			7	6	15	1	8	3			12	546	45.5	3
Keratitis				1	1	2		2				2	60	30	
Neuro-retinitis				3	2	5		5				5	316	63.2	
Ophthalmia				3	3	6	1	3	1			5	116	23.2	1
Optic atrophy				2	2	4		1	3			4	54	13.5	
Panophthalmitis				2		2	1		1			2	60	30	
Pterygium		1		1		2	1		1			2	48	24	
Ruptured cornea				1	1	2		2				2	26	13	
Strabismus				2		2		1				1	117	117	1
Sympathetic ophthalmia				1		1		1				1	7	7	
Ear.															
Mastoiditis				2	3	5		3	1			4	89	22.2	1
Otitis media	1			5	1	7	1	6				7	106	15.1	
Nose.															
Deflected septum					1	1		1				1	16	16	
Throat.															
Pharyngitis				1	1	2		2				2	25	12.5	
Tonsillitis, chronic	5		1	82	115	203	147	46	6			199	1,230	6.1	4
Genito-urinary system.															
Calculus				1	1	2		1				1	6	6	1
Chancroid				18	1	19	3	12	1			16	504	31.5	7
Cystitis				2	6	8	1	6				7	123	17.5	1
Epididymitis				26		26	3	19	2			24	280	11.5	2
Fistula, urinary				7		7		2	1			3	53	17.6	4
Gonorrhea		11		15	6	22	2	16	2			20	280	14	2
Hematuria				1	3	4		3				3	49	16.3	1
Hydrocele				5		5	4		1			5	88	17.6	
Kidney:															
Acute parenchymatous nephritis				7	5	12	1	2			8	11	224	20.3	1
Chronic interstitial nephritis	7	1	1	44	37	90		39	8		37	84	2,407	28.4	6
Tuberculosis kidney	1			5	1	7		6	1			7	197	28	
Orchitis				2		2		2				2	9	4.5	
Phimosis	3	1		58		62	34	23	2			59	1,050	17.8	3
Phlegmon of scrotum				1		1	1					1	51	51	
Prostatitis	2	1		26		30	6	15	1		5	27	883	32.7	3
Stricture				17		17	2	11	2			15	126	8.3	2
Varicocele		1		3		4	1	2	1			4	54	13.5	

Medical and surgical diseases, except pay patients—Continued.

Disease.	Remaining July 1, 1916.	Admitted.					Discharged.						Total number of days in hospital.	Average number of days in hospital.	Remaining July 1, 1917.
		White.		Colored.											
		Male.	Female.	Male.	Female.	Total.	Recovered.	Improved.	Unimproved.	Not treated.	Dead.	Total.			
Gynecological.															
Abortion	4				51	55	40	10			3	53	638	12	2
Abortion, threatened					8	8	4	2				6	63	10.5	2
Carcinoma cervix	1				22	23			18		5	23	375	16.2	
Cyst, broad ligament	1					1		1				1	67	67	
Ectopic gestation	2				4	6	5	1				6	170	28	
Endometritis	2				21	23	12	8	1			22	350	1	1
Fibroma uteri	12				135	147	118	13	3		5	139	3,594	25.9	8
Fistula, recto-vaginal					4	4	1		2		1	4	110	27.5	
Hypertrophied cervix					3	3	3					3	59	19.6	
Incarcerated pregnant uterus					1	1	1					1	21	21	
Lacerated cervix					11	11	6	2	2			10	191	19.1	1
Lacerated perineum	2				37	39	30	4	4			38	893	23	1
Menopause					2	2		2				2	40	20	
Menstral disorders:															
Amenorrhea					1	1			1			1	1	1	
Dysmenorrhea					5	5	1	3				4	40	10	1
Ovary:															
Cystic ovary	1				33	34	25	6	1		1	33	706	21.3	1
Ovarian cyst					4	4	2	1				3	96	32	1
Post operative adhesions			1		16	17	9	8				17	360	21.1	
Procidentia	1				2	3	1	1	1			3	108	36	
Pyosalpingitis	5				55	60	52	5	1		1	59	1,647	27.9	1
Retroverted uterus					25	25	14	7	2			23	384	16.6	2
Salpingitis	7				137	144	86	31	4		2	123	2,751	22.3	21
Stenosis cervix					2	2	2					2	22	11	
Infectious diseases.															
Broncho-pneumonia				8	7	15	6	4			5	15	291	19.3	
Cerebrospinal meningitis				4	3	7	1				6	7	40	5.7	
Diphtheria	1					1	1					1	35	35	
Influenza				11	8	19	13	6				19	315	16.5	
Malaria				2	3	5	5					5	105	21	
Measles				2	1	3		2	1			3	113	37.6	
Pellagra					1	1					1	1	28	28	
Pneumonia, lobar	2			42	22	66	38	6	1		19	69	1,073	16.7	2
Rheumatic fever	1			8	14	23	10	11				21	726	34.5	2
Septicemia					1	1					1	1	1	1	
Syphilis:															
Cerebral	3			4		7		5			2	7	435	62.1	
Congenital				4	1	5		1	1		3	5	207	41.4	
Primary				3	6	9		7	1			8	68	8.5	1
Secondary	9	2		39	15	65		56	6			62	2,235	36	3
Tertiary	1			20	10	31		27	3			30	787	26.2	1
Tetanus				4		4	1		1		2	4	53	13	
Trichinosis				1		1		1				1	29	29	
Tuberculosis	1			19	20	40		15	17		8	40	926	23.1	
Typhoid fever	2	1		18	22	43	28	3			7	38	1,636	43	5
Whooping cough					1	1		1				1	4	4	
Injuries.															
Burns:															
Body				3	7	10	3	2			5	10	123	12.3	
Face					1	1	1					1	32	32	
Hand				1	1	2	1		1			2	5	2.5	
Leg	1			1	1	3		2				2	61	30.5	1
Foreign body:															
Bladder					1	1			1			1	1	1	
Foot					1	1	1					1	21	21	
Wounds:															
Contused—															
Abdomen		1		2	1	4		4				4	17	4.2	
Back	1			3	5	9	2	4	2			8	73	9.1	1
Face				3	1	4	1	1	2			4	11	2.7	
Foot				6	2	8	2	5				7	42	6	1
Forearm					1	1			1			1	1	1	
Hip				1		1		1				1	1	1	
Scalp				2		2	1	1				2	11	5.5	
Shoulder				1	2	3	1	2				3	15	5	

Medical and surgical diseases, except pay patients—Continued.

Disease.	Remaining July 1, 1916.	Admitted.					Discharged.						Total number of days in hospital.	Average number of days in hospital.	Remaining July 1, 1917.
		White.		Colored.											
		Male.	Female.	Male.	Female.	Total.	Recovered.	Improved.	Unimproved.	Not treated.	Dead.	Total.			
Injuries—Continued.															
Wounds—Continued.															
Gunshot—															
Back				1		1		1				1	2	2	
Hand				2	2	4		2			1	3	35	11.6	1
Leg				2		2	1	1				2	19	9.5	
Lung				2		2	1				1	2	21	10.5	
Neck				1		1	1					1	23	23	
Skull				1		1					1	1	1	1	
Thigh				2		2	1	1				2	92	46	
Incised—															
Abdomen				1		1		1				1	4	4	
Foot				1		1	1					1	21	21	
Scalp				3	1	4	1	3				4	34	8.5	
Tendons, wrist				1		1		1				1	141	141	
Thigh				1		1		1				1	1	1	
Lacerated—															
Face		2		1		3	2	1				3	16	5.3	
Forearm					1	1		1				1	24	24	
Hand				1	1	2	1	1				2	77	38.5	
Leg				4		4	2	1				3	48	16	1
Scalp				8	1	9	1	8				9	37	4.1	
Punctured—															
Back				2		2		1				1	3	3	1
Leg	1			1		2	1	1				2	65	32.5	
Lung				1		1		1				1	11	11	
Lymphatics.															
Adenitis:															
Cervical	1			3	11	15	3	9				12	416	34.6	3
Inguinal	2			37	9	48	9	34	3			46	839	18.2	2
Peritonitis				5	7	12	1	2			9	12	134	11.1	
Peritonitis, tuberculous.				7	3	10	1	7			2	10	212	21.2	
Nervous system.															
Aphemia				1		1		1				1	20	20	
Chronic hydrocephalus		1				1		1				1	22	22	
Concussion, brain				6	4	10	5	5				10	106	10.6	
Dementia				1	1	2			2			2	4	2	
Epilepsy		5		7		12		12				12	25	2	
Hysteria			1		13	14	2	12				14	159	11.3	
Muscular atrophy	1					1					1	1	326	326	
Neurasthenia	1	1	1	3	13	19		14	2			16	240	15	3
Neuritis		1		5	4	10	3	4	1			8	157	19.6	2
Paralysis	3			11	10	24		17	3		2	22	1,513	69	2
Syncope				2	2	4		3				3	3	1	1
Syringomyelia				1		1			1			1	22	22	
Tetany					1	1	1					1	64	64	
Poisoning.															
Alcoholism:															
Acute		6		11	1	18	8	10				18	50	2.7	
Chronic				5	1	6	1	2	2		1	6	43	7.1	
Autointoxication				1	2	3	1	2				3	26	8.6	
Gas poisoning		1		1	1	3		2			1	3	7	2.3	
Iodine					1	1		1				1	1	1	
Mercury		1		2		3	1	1			1	3	27	9	
Potash				1		1	1					1	2	2	
Ptomaine				1	1	2	1	1				2	5	2.5	
Sunstroke				6		6	2	2	1		1	6	17	2.9	
Respiratory system.															
Bronchial asthma				4		4		3				3	42	14	1
Bronchitis:															
Acute				14	10	24	12	10				22	235	10.6	2
Chronic				7		7	1	6				7	108	15.4	
Laryngitis, acute					1	1	1					1	16	16	

Medical and surgical diseases, except pay patients—Continued.

Disease.	Remaining July 1, 1916.	Admitted.					Discharged.						Total number of days in hospital.	Average number of days in hospital.	Remaining July 1, 1917.
		White.		Colored.											
		Male.	Female.	Male.	Female.	Total.	Recovered.	Improved.	Unimproved.	Not treated.	Dead.	Total.			
Respiratory system—Continued.															
Pleura:															
Acute	1			10	4	15	4	7			2	13	309	23.7	2
Chronic				1	1	2	1	1				2	102	51	
Empyema	2			8		10	2	6			1	9	334	37	1
Pulmonary embolus					1	1					1	1	6	6	
Skin.															
Dermatitis				1	1	2	1					1	67	67	1
Eczema	2			2	1	5	3	1				4	98	24.5	1
Scabies				1		1	1					1	5	5	
Seborrhea	1			1	1	3	1	2				3	38	12.6	
Urticaria				3		3		3				3	50	16.6	
Tumors.															
Cancer:															
Antrum					1	1					1	1	12	12	
Bladder		2			2			1			1	2	37	18.5	
Breast	1			1	13	15	7	3	2		1	13	466	35	2
Hand				1		1		1				1	4	4	
Hard palate				1		1			1			1	40	40	
Intestine					1	1					1	1	66	66	
Lip		1				1			1			1	133	133	
Liver				2	2	4			2		2	4	101	25.2	
Pancreas				1		1		1				1	30	30	
Penis				1		1					1	1	47	47	
Rectum				4	2	6			2		3	5	55	11	1
Stomach	2			5	3	10		1	2		6	9	183	20.3	1
Tongue				1		1									1
Chronic cystic mastitis			1			1	1					1	15	15	
Epulis					3	3	2	1				3	40	13.3	
Fibroma, breast	1					1		1				1	19	19	
Goiter:															
Exophthalmic					5	5	1	3				4	105	26.2	1
Simple	2				9	11	8	2	1			11	259	23.5	
Hemangioma					1	1	1					1	31	31	
Keloid				4	1	5		3				3	12	4	2
Lipoma					3	3	3					3	91	30.3	
Mixed tumor parotid				1	2	3	1	2				3	36	12	
Sarcoma	1			5	3	9		4	1		2	7	269	38.7	2
Sebaceous cyst				1		1		1				1	3	3	
Tumor, brain				1		1			1			1	5	5	
Births:															
Living				153	171	324	297				18	315	3,945	12.5	9
Remaining	11					11	11					11	155	14	
Babies with mother				3	5	8				7		7	153	21.8	1
Pregnancy:															
Delivered	7				336	343	329				3	332	6,382	19.2	11
Undelivered					41	41			30			30	323	10.7	11
Puerperal sepsis					2	2		1			1	2	84	42	
Puerperium	11				2	13	11	2				13	229	17	
Toxemia of pregnancy					3	3	1				2	3	26	8.6	
Total	204	45	9	1,457	2,000	3,715	1,786	1,181	229	7	283	3,486			229

Medical and surgical diseases, pay patients.

Disease.	Remaining July 1, 1916.	Admitted.					Discharged.						Total number of days in hospital.	Average number of days in hospital.	Remaining July 1, 1917.
		White.		Colored.											
		Male.	Female.	Male.	Female.	Total.	Recovered.	Improved.	Unimproved.	Not treated.	Dead.	Total.			
Abortion	....	....	....	.....	2	2	2	.....	....	....	....	2	18	9	....
Adenoma testicle	....	....	....	1	.....	1	1	.....	....	....	....	1	28	28	....
Adherent clitoris	....	....	1	.....	.....	1	1	.....	....	....	....	1	29	29	....
Alcoholism	....	1	....	2	.....	3	2	.....	1	....	....	3	12	4	....
Ankylosis knee	....	....	....	.....	1	1	.....	1	....	....	....	1	12	12	....
Appendicitis	1	1	....	6	7	15	9	3	1	....	1	14	253	18	1
Bilateral interligamentous cyst	....	....	....	.....	1	1	1	.....	....	....	....	1	28	28	....
Births	....	....	....	12	24	36	31	.....	....	....	4	35	391	11	1
Broncho-pneumonia	....	....	....	1	.....	1	1	.....	....	....	....	1	20	20	....
Burn of arms	....	....	....	1	.....	1	.....	1	....	....	....	1	14	14	....
Carcinoma:															
Breast	....	....	....	.....	3	3	1	1	1	....	....	3	73	24.3	....
Cervix	....	....	....	.....	4	4	.....	2	1	....	1	4	50	12.5	....
Stomach	....	....	....	1	2	3	.....	.....	1	....	2	3	21	7	....
Chronic constipation	....	....	....	.....	1	1	.....	1	....	....	....	1	7	7	....
Cholecystitis	....	....	....	.....	1	1	1	.....	....	....	....	1	21	21	....
Contused wounds of body	....	....	....	.....	1	1	.....	1	....	....	....	1	14	14	....
Cystic ovaries	....	....	....	.....	3	3	2	1	....	....	....	3	42	14	....
Dementia	....	....	....	.....	1	1	.....	.....	1	....	....	1	4	4	....
Dentigerous cyst	....	....	....	.....	1	1	.....	1	....	....	....	1	1	1	....
Diabetes mellitus	....	....	....	1	.....	1	.....	1	....	....	....	1	8	8	....
Dislocation, jaw	....	....	....	1	.....	1	.....	1	....	....	....	1	6	6	....
Ectopic gestation	....	....	....	.....	1	1	.....	.....	....	....	....	.....	.....	.....	1
Empyema	....	....	....	2	1	3	2	.....	....	....	....	2	16	8	1
Endometritis	....	....	....	.....	6	6	4	1	....	....	....	5	74	14.8	1
Erysipelas	....	....	....	1	1	2	1	.....	....	....	1	2	17	8.5	....
Femoral adenitis	....	....	....	1	.....	1	1	.....	....	....	....	1	12	12	....
Fibroma uteri	3	....	....	.....	41	44	34	2	1	....	5	42	821	19	2
Fistula in ano	....	....	....	1	1	2	2	.....	....	....	....	2	49	24.5	....
Fracture:															
Patella	1	....	....	.....	1	2	.....	2	....	....	....	2	45	22.5	....
Radius	1	....	....	.....	1	2	.....	2	....	....	....	2	31	15.5	....
Scapula	....	....	....	1	.....	1	.....	1	....	....	....	1	7	7	....
Tibia	....	....	....	2	2	4	2	2	....	....	....	4	119	29.7	....
Gastritis, chronic	1	1	....	.....	1	3	1	2	....	....	....	3	25	8.3	....
Gastric ulcer	....	....	....	.....	1	1	.....	1	....	....	....	1	35	35	....
Goiter:															
Cystic	....	....	....	1	4	5	2	2	....	....	1	5	63	12.6	....
Exophthalmic	....	....	....	.....	1	1	1	.....	....	....	....	1	9	9	....
Gunshot wound, lung	....	....	....	1	.....	1	.....	1	....	....	....	1	7	7	....
Hemorrhoids	....	....	....	2	3	5	5	.....	....	....	....	5	68	13.6	....
Hydrocele	....	....	....	1	.....	1	.....	1	....	....	....	1	8	8	....
Hyperemesis gravidarum	....	....	....	.....	2	2	1	1	....	....	....	2	19	9.5	....
Infected hand	....	....	....	1	1	2	1	1	....	....	....	2	33	16.5	....
Influenza	....	....	....	1	4	5	3	1	....	....	1	5	87	17.4	....
Inguinal hernia	....	....	....	9	5	14	13	1	....	....	....	14	195	14	....
Intestinal obstruction	....	....	....	.....	2	2	1	.....	....	....	....	1	26	26	1
Ischio-rectal abscess	....	....	....	1	.....	1	.....	1	....	....	....	1	3	3	....
Lacerated perineum	....	....	....	.....	2	2	2	.....	....	....	....	2	38	19	....
Lipoma cheek	....	....	....	.....	1	1	1	.....	....	....	....	1	14	14	....
Lobar pneumonia	....	....	....	3	1	4	2	.....	....	....	2	4	37	9.2	....
Locomotor ataxia	....	....	....	1	.....	1	.....	1	....	....	....	1	14	14	....
Marasmus	....	1	....	.....	.....	1	.....	.....	....	....	1	1	12	12	....
Meningitis	....	....	....	1	1	2	.....	1	....	....	1	2	25	12.5	....
Mitral insufficiency	....	....	....	7	3	10	.....	8	....	....	2	10	238	23.8	....
Nephritis, chronic interstitial	1	....	....	4	5	10	.....	3	....	....	4	7	146	20.8	3
Neurasthenia	....	....	....	5	4	9	.....	8	1	....	....	9	168	18.6	....
Parotitis	....	....	....	1	.....	1	.....	1	....	....	....	1	4	4	....
Peritonitis	....	....	....	.....	1	1	1	.....	....	....	....	1	31	31	....
Phimosis	....	1	....	2	.....	3	1	2	....	....	....	3	6	2	....
Phlebitis (leg)	....	....	....	.....	1	1	.....	1	....	....	....	1	28	28	....
Pregnancy	1	....	....	.....	39	40	38	.....	....	....	1	39	503	12.9	1
Prostatitis	....	....	....	3	.....	3	.....	3	....	....	....	3	59	19.6	....
Post operative adhesions	....	....	....	1	1	2	1	1	....	....	....	2	30	15	....
Retinitis	....	....	....	1	.....	1	.....	1	....	....	....	1	35	35	....
Retroverted uterus	....	....	....	.....	1	1	1	.....	....	....	....	1	14	14	....
Rheumatic fever	....	....	....	2	2	4	.....	2	1	....	....	3	49	16.3	1
Salpingitis	....	....	....	.....	17	17	13	2	1	....	1	17	270	15.9	....
Senality	....	....	....	1	1	2	.....	2	....	....	....	2	14	7	....
Stab wound (arm)	....	....	....	1	.....	1	.....	1	....	....	....	1	6	6	....

Medical and surgical diseases, pay patients—Continued.

Disease.	Remaining July 1, 1917.	Admitted.					Discharged.						Total number of days in hospital.	Average number of days in hospital.	Remaining July 1, 1917.
		White.		Colored.											
		Male.	Female.	Male.	Female.	Total.	Recovered.	Improved.	Unimproved.	Not treated.	Dead.	Total.			
Stricture, rectum	1					1		1				1	35	35	
Stricture, urethra				2		2		2				2	34	17	
Syphilis	1			4	3	8		4	2		1	7	1,020	145	1
Stomatitis				1		1		1				1	17	17	
Talipes equino varus					1	1		1				1	63	63	
Tenosynovitis				1		1		1				1	7	7	
Tonsillitis, chronic				11	13	24	17	6	1			24	65	2.7	
Tuberculous abscess				1		1		1				1	1	1	
Tuberculous peritonitis					1	1	1					1	25	25	
Typhoid fever					1	1		1				1	14	14	
Ulcer, cornea				2	2	4		2				2	28	14	2
Ureteral calculus				1		1	1					1	25	25	
Use operating room				2		2				2		2			
Vulvo vaginal abscess					2	2	2					2	15	7.5	
Wasserman reaction				1	1	2				2		2			
X-ray		1	2	14	7	24				24		24			
Stillbirth				1											
Total	11	6	3	124	242	386	207	93	13	28	28	370			16

Operations and results, all patients.

Operation.	Diagnosis.	White.		Colored.		Total.	Recovered.	Improved.	Unimproved.	Died.
		Male.	Female.	Male.	Female.					
Adenectomy	Adenitis:									
	Cervical			2	5	7	3	4		
	Femoral			2		2	1	1		
	Inguinal			14	3	17	9	7		1
Adenoidectomy	Adenoids	3	1	86	137	227	207	20		
Amputation:										
Arm	Epithelioma			1		1		1		
	Gangrene			1		1				1
Partial	Elongated labia		1			1		1		
Breast (radical)	Carcinona		1	2	12	15		13		2
Cervix	Elongated				2	2	1	1		
	Hypertrophied				1	1	1			
	Lacerated				3	3	3			
Finger	Cellulitis			5	3	8		8		
	Gangrene				2	2		2		
	Tuberculosis			1		1		1		
Foot	Gangrene			3	2	5		5		
Leg	Gangrene			2	3	5		4		1
Septum	Elongated scrotum (partial)			1		1	1			
Shoulder joint	Sarcoma			1	1	2	1			1
Toes	Gangrene			6	5	11		10		1
Arthrectomy	Tuberculosis, knee joint				2	2		2		
Cauterization	Abdominal wall, fracture of	1		2		3		3		
	Arm, laceration of	1		8	3	12		12		
	Back, laceration of			3	2	5		5		
	Chin, laceration of			2	2	4		4		
	Chest, laceration of	1		3	2	6		6		
	Face, laceration of	1		16	3	20		20		
	Finger, laceration of	5	1	20	10	36		36		
	Foot, laceration of			17	5	22		22		
	Hand, laceration of	6		27	7	40		40		
	Leg, laceration of	1		13	4	18		18		
	Lip, laceration of			3	3	6		6		
	Neck, laceration of	1		4	2	7		7		
	Nose, laceration of			3	1	4		4		
	Scalp, laceration of	3		32	11	46		46		
	Thigh, laceration of			6	2	8		8		
	Uteri, cervix, carcinoma of				6	6		5	1	
	Uterus, cervix, carcinoma of				2	2		2		
	Ulcer of cornea			3	1	4		4		

Operations and results, all patients—Continued.

Operation.	Diagnosis.	White.		Colored.		Total.	Recovered.	Improved.	Unimproved.	Died.
		Male.	Female.	Male.	Female.					
Celiotomy	Appendectomy:									
	Acute appendicitis	....	....	5	3	8	3	3	....	2
	Chronic appendicitis	....	....	25	127	152	118	28	....	6
	Gangrenous appendicitis	....	....	3	.....	3	.....	3	.....	.....
	Subacute appendicitis	....	....	1	26	27	25	2	.....	.....
	Perforative appendicitis	....	....	7	4	11	5	4	....	2
Cæsarean section	Contracted pelvis	....	....	.....	5	5	4	.....	....	1
	Eclampsia, puerperal	....	....	.....	1	1	.....	.....	....	1
Cholecystostomy	Cholelithiasis	....	....	3	6	9	6	3	....	.....
Colostomy, inguinal.	Carcinoma of rectum	....	....	1	.....	1	.....	.....	....	1
Cystostomy	Calcali, vesical	....	....	1	.....	1	1	.....	.....	.....
	Hypertrophied prostate	....	....	15	.....	15	.....	13	....	2
Decompression	Depressed fracture of skull	....	....	6	.....	6	.....	3	....	3
Enterostomy	Postoperative toxemia	....	....	.....	1	1	.....	.....	....	1
Exploratory	Abscess:									
	Appendiceal	....	....	.....	.....	.....	.....	.....	.....	.....
	Pelvic	....	....	.....	.....	.....	.....	.....	.....	.....
	Carcinoma:									
	Pancreas	....	....	1	.....	1	.....	.....	1	.....
	Stomach	....	....	2	.....	2	.....	1	....	1
	Carcinomatosis (general)	....	....	.....	1	1	.....	.....	1	.....
	Fibroid uterus	....	....	.....	.....	.....	.....	.....	.....	.....
	Complicating pregnancy	....	....	.....	2	2	.....	.....	2	.....
	Pregnancy (indefinite)	....	....	.....	3	3	.....	.....	3	.....
	Peritonitis (tuberculosis)	....	....	5	2	7	.....	7	.....	.....
	Perihepatitis	....	....	.....	1	1	.....	.....	1	.....
	Post operative adhesions	....	....	.....	1	1	1	.....	.....	.....
	Pyosalpinx (inoperable)	....	....	.....	1	1	.....	.....	1	.....
	Ureteral calculus	....	....	1	.....	1	1	.....	.....	.....
Freeing of adhesions.	Adherent clitoris	....	1	.....	.....	1	1	.....	.....	.....
	Ovarian adhesions	....	....	.....	1	1	.....	1	.....	.....
	Obstruction (intestinal)	....	....	1	1	2	1	.....	....	1
	Postoperative adhesions	....	....	1	8	9	.....	9	.....	.....
	Salpingitis	....	....	.....	5	5	.....	5	.....	.....
Gastro-jejunostomy.	Duodenal ulcer	....	....	1	1	2	.....	2	.....	.....
Gastrectomy (partial).	Carcinoma of stomach	....	....	1	.....	1	.....	.....	....	1
Hysterectomy (supravaginal).	Fibroid of uterus	....	....	20	20	12	6	.....	....	2
	Chronic metritis	....	....	13	13	13	.....	.....	.....	.....
	Essential hemorrage of uterus	....	....	1	1	1	.....	.....	.....	.....
	Hystero-epilepsy	....	....	1	1	.....	1	.....	.....	.....
	Procidentia (complete)	....	....	.....	2	2	1	1	.....	.....
	Toxemia of pregnancy, with fibroid.	....	....	.....	1	1	1	.....	.....	.....
Hyster-salpingo-oophorectomy.	Fibroid uterus, pyosalpinx, and cystic ovary.	....	....	.....	52	52	40	10	....	2
	Fibroid uterus, salpingitis, and cystic ovary.	....	....	.....	40	40	30	8	....	2
	Fibroid uterus and cystic ovary.	....	....	.....	26	26	22	3	....	1
	Bilateral pyosalpinx and cystic ovary.	....	....	.....	41	41	33	7	....	1
	Salpingitis and cystic ovary	....	....	.....	21	21	13	7	....	1
	Metritic uterus and cystic ovary	....	....	.....	28	28	28	.....	.....	.....
	Fibroid uterus, ectopic pregnancy, and cystic ovary.	....	....	.....	2	2	.....	2	.....	.....
	Infantile uterus and cystic ovary.	....	....	.....	1	1	1	.....	.....	.....
	Salpingo-oophoritis	....	....	.....	7	7	5	2	.....	.....
Hystero-oophorectomy.	Fibroid uterus and cystic ovary.	....	....	.....	5	5	3	2	.....	.....
Hystero-salpingectomy.	Pyosalpingitis	....	....	.....	4	4	1	3	.....	.....
	Fibroid uterus and hydrosalpinx.	....	....	.....	3	3	3	.....	.....	.....
	Fibroid uterus and pyosalpinx.	....	....	.....	8	8	7	.....	....	1
	Fibroid uterus and salpingitis.	....	....	.....	5	5	2	3	.....	.....
Oophorectomy	Cystic ovary	....	....	.....	22	22	22	.....	.....	.....
	Dermoid cyst of ovary	....	....	.....	1	1	1	.....	.....	.....
Posthysterectomy.	Metritic uterus and pyosalpinx.	....	....	.....	1	1	.....	1	.....	.....
	Carcinoma of cervix	....	....	.....	2	2	.....	1	....	1
	Fibroid uterus	....	....	.....	1	1	.....	1	.....	.....

Operations and results, all patients—Continued.

Operation.	Diagnosis.	White.		Colored.		Total.	Recovered.	Improved.	Unimproved.	Died.
		Male.	Female.	Male.	Female.					
Celiotomy—Contd.										
Salpingo-oophorectomy.	Pyosalpinx and cystic ovary	....	....	.....	26	26	10	16	....	....
	Salpingitis and cystic ovary	....	....	.....	96	96	80	16	....	....
	Varicocele of pampiniform plexus.	....	....	.....	1	1	1	.....	....	....
	Ovarian cyst	....	....	.....	1	1	1	.....	....	....
	Tubo-ovarian abscess	....	....	.....	14	14	11	1	....	2
	Ectopic gestation	....	....	.....	8	8	6	2	....	....
Salpingectomy	Hydrosalpinx	....	....	.....	14	14	13	1	....	....
	Salpingitis	....	....	.....	10	10	4	6	....	....
Suspension	Retroflexed uterus	....	....	.....	9	9	.....	9	....	....
Irrigation of Fallopian tubes.	Acute salpingitis	....	....	.....	2	2	1	.....	....	1
Litholapaxy	Vesical calculi	....	....	1	.....	1	.....	1	....	....
Circumcision	Paraphimosis	....	....	3	.....	3	3	.....	....	....
	Phimosis	....	....	35	.....	35	31	4	....	....
	Elongated prepuce	1	....	26	.....	27	26	1	....	....
Colporrhaphy (anterior).	Cystocele	....	....	.....	2	2	.....	2	....	....
Cystoscopy	Carcinoma of bladder	....	....	3	.....	3	.....	.....	3	....
	Cystitis	....	....	3	.....	3	.....	.....	3	....
	Hematuria	....	....	3	.....	3	.....	.....	3	....
	Posterior urethritis and prostatitis.	....	....	6	.....	6	.....	.....	6	....
	Hypertrophied prostate	....	....	6	.....	6	.....	.....	6	....
	Pyelitis	....	....	1	.....	1	.....	.....	1	....
	Tuberculosis of bladder	....	....	1	.....	1	.....	.....	1	....
	Syphilis of bladder	....	....	6	.....	6	.....	.....	6	....
Curettment	Endocervicitis (chronic)	....	....	.....	7	7	.....	7	....	....
	Endometritis, chronic	....	....	.....	38	38	.....	38	....	....
	Periostitis	....	1	1	.....	2	.....	2	....	....
	Osteomyelitis	....	....	.....	6	6	.....	6	....	....
	Retained secundines	....	....	.....	17	17	14	.....	....	3
	Venereal condylmata	....	....	1	.....	1	.....	1	....	....
Dilatation	Esophagus, stricture of	....	....	1	.....	1	.....	.....	....	1
	Fissure in ano	....	....	7	3	10	10	.....	....	....
	Rectum, stricture of	....	....	.....	5	5	.....	5	....	....
	Stenosis of cervix	....	....	.....	3	3	.....	3	....	....
	Urethra, stricture of	....	....	4	.....	4	.....	4	....	....
Enucleation, eye	Iridocyclitis	....	....	2	1	3	.....	3	....	....
	Phthisis bulbi	....	....	.....	2	2	.....	2	....	....
	Sympathetic	....	....	.....	.....	.....	.....	.....	....	....
	Ophthalmia	....	....	3	2	5	.....	5	....	....
Epididymectomy	Epididymitis	....	....	5	.....	5	2	3	....	....
Excision:										
Gland	Bartholinitis	....	....	.....	3	3	3	.....	....	....
	Chalazion	....	....	8	6	14	14	.....	....	....
	Epulis (lower jaw)	....	....	.....	2	2	.....	2	....	....
Tract	Fistula in ano	....	....	10	9	19	15	4	....	....
Sac	Hydrocele of cord	....	....	6	.....	6	5	1	....	....
	Hemangioma	....	....	.....	1	1	1	.....	....	....
	Keloid	....	....	2	.....	2	.....	2	....	....
	Lipoma	....	....	.....	3	3	3	.....	....	....
	Pterygium	....	....	1	1	2	1	1	....	....
	Polypi	....	....	3	2	5	5	.....	....	....
	Parotid (tumor of)	....	....	1	1	2	2	.....	....	....
Tumor	Sarcoma of shoulder	....	....	.....	1	1	.....	.....	....	1
	Tuberculous syphilide	....	....	1	.....	1	.....	1	....	....
	Urethro-scrotal fistula	....	....	5	.....	5	1	4	....	....
Veins	Varicocele	....	....	4	.....	4	4	.....	....	....
	Varicose veins of leg	....	1	4	5	10	5	5	....	....
Extraction	Cataract	....	....	2	6	8	.....	8	....	....
Hemorrhoidectomy	Hemorrhoids:									
	External	....	....	8	5	13	11	2	....	....
	Internal	....	....	12	6	18	16	2	....	....
	Mixed	....	....	6	5	11	9	2	....	....
Hernioplasty	Hernia:									
	Inguinal (indirect)	....	....	54	10	64	.....	62	....	2
	Inguinal (direct)	1	....	4	.....	5	.....	5	....	....
	Femoral	....	....	.....	2	2	.....	2	....	....
	Umbilical	....	....	5	5	10	.....	10	....	....
	Ventral	....	....	3	3	6	.....	6	....	....

Operations and results, all patients—Continued.

Operation.	Diagnosis.	White.		Colored.		Total.	Recovered.	Improved.	Unimproved.	Died.
		Male.	Female.	Male.	Female.					
Incision and drain	Abscess:									
	Appendiceal			4	2	6	1	3		2
	Arm			3	2	5		5		
	Breast				5	5		5		
	Cervical region				2	2		2		
	Ear			3	4	7		7		
	Ischio-rectal			12	10	22	7	15		
	Lung				1	1		1		
	Pelvic				5	5		4		1
	Perineal			4		4		4		
	Periurethral			5		5		3		2
	Peritonsillar			7	5	12		12		
	Perinephritic			1		1		1		
	Supraorbital				1	1		1		
	Submaxillary			1		1	1			
	Scrotal			4		4		3		1
	Subdiaphragmatic			1		1		1		
	Vulvo-vaginal				2	2		2		
	Adenitis:									
	Inguinal			12	4	16	11	5		
	Cervical			2	3	5		5		
	Cellulitis:									
	Arm	2		5	4	11	7	4		
	Neck			2	3	5		5		
	Face			14	6	20		20		
	Foot			5	3	8		8		
	Finger			13	9	22		22		
	Hand			16	7	23		23		
	Leg			6	4	10		10		
	Thigh			4		4	1	2		1
	Chancroidal phimosis			2		2		2		
	Infected hematoma			1		1	1			
	Stricture of rectum				1	1		1		
	Frontal sinusitis				3	3		3		
	Maxillary sinusitis				2	2		2		
	Osteomyelitis of lower jaw				3	3		3		
Iridectomy	Glaucoma			2	4	6		6		
	Prolapse of iris and cornea				1	1		1		
Ligation:										
Common carotid artery.	Carcinoma, upper jaw				1	1				1
Superior thyroid artery.	Malignant goiter				1	1		1		
	Thyrotoxicosis				1	1		1		
Saphenous vein	Varicose veins		1			1		1		
	Varicose ulcer				1	1		1		
Mastoidectomy	Mastoiditis			2	4	6	4	2		
Manipulation and cast.	Acute infectious arthritis				1	1		1		
	Ankylosis:									
	Ankle joint			2	2	4		4		
	Knee joint			2	1	3		3		
	Elbow joint			1		1		1		
	Flat foot			4	8	12		12		
	Congenital club foot			3		3		3		
Needling	Cataract				6	6		6		
	Glaucoma				1	1		1		
Nephrectomy	Tuberculosis of kidney			3		3		3		
Orchidectomy	Adeno-cystoma of testicle			2		2	1	1		
	Tuberculosis of testicle	1		2		3		3		
Osteotomy and curettage.	Osteomyelitis:									
	Frontal bone			1	1	2		1		1
	Femur				2	2		2		
	Knee joint				1	1		1		
	Lower jaw			4	3	7		7		
	Os calcis		1			1		1		
	Scaphoid bone				1	1		1		
	Upper jaw			2		2		2		
	Genu valgum			2	1	3		3		
	Ankylosis hip joint			2		2		2		
Paracentesis	Arthritis with effusion				2	2		2		
Abdominalis	Carcinomatosis				2	2			2	
	Mitral insufficiency			4	3	7		7		
Thoracis	Pleurisy with effusion			4	2	6		6		
Perineal section	Perineal abscess			3		3		3		
	Perineal fistulae			1		1		1		
	Rupture of urethra			1		1		1		
	Stricture of urethra			2		2		2		

Operations and results, all patients—Continued.

Operation.	Diagnosis.	White.		Colored.		Total.	Recovered.	Improved.	Unimproved.	Died.
		Male.	Female.	Male.	Female.					
Perineorrhaphy	Lacerated perineum	....	....	.....	41	41	30	11	....	....
Posterior colpotomy	Pelvic abscess	....	....	.....	3	3	.....	3	....	....
	Ovarian cyst	....	....	.....	1	1	.....	1	....	....
Prostatectomy	Hypertrophied prostate	....	....	14	.....	14	4	8	....	2
Plastic	Suppurative abdominal wound	....	....	1	.....	1	.....	1	....	....
Penis	Chancroidal infection	....	....	13	.....	13	.....	13	....	....
	Paraphimosis	2	....	2	.....	4	2	2	....	....
	Martin's modification of Ball's operation for pruritus ani.	....	....	1	.....	1	.....	1	....	....
	Vesico-vaginal fistula	....	....	.....	2	2	1	1	....	....
	Ectropion	....	....	2	.....	2	.....	2	....	....
Ovary	Cystic ovary	....	....	.....	24	24	22	2	....	....
Toe	Ingrowing toenail	....	....	6	8	14	4	10	....	....
	Adhesions due to burns	....	....	3	.....	3	.....	3	....	....
	Fecal fistula	....	....	.....	1	1	.....	.....	....	1
Reduction and fixation	Dislocation:									
	Knee	....	....	2	.....	2	.....	2	....	....
	Lower jaw	....	....	1	1	2	.....	2	....	....
	Shoulder	....	....	3	1	4	.....	4	....	....
	Lumbar vertebra	....	....	1	.....	1	.....	1	....	....
	Fracture:									
	Colle's	2	....	5	4	11	.....	11	....	....
	External condyle of humerus.	....	....	2	2	4	.....	4	....	....
	Femur	....	....	6	2	8	2	6	....	....
	Humerus	....	....	5	2	7	2	5	....	....
	Internal condyle of humerus.	....	....	2	.....	2	.....	2	....	....
	Malar bone	....	....	2	.....	2	.....	2	....	....
	Mandible	....	....	4	.....	4	.....	4	....	....
	Metacarpal	....	....	1	.....	1	.....	1	....	....
	Patella	....	....	.....	2	2	.....	2	....	....
	Radius	1	....	2	.....	3	.....	3	....	....
	Tibia	....	....	1	1	2	.....	2	....	....
	Tibia and fibula	....	....	4	1	5	1	3	....	1
Resection:										
Rib	Empyema	....	....	3	2	5	.....	5	....	....
Nerve	Musculo-spiral paralysis	....	....	1	1	2	.....	2	....	....
Intestines	Gangrene	....	....	.....	2	2	.....	1	....	....
Removal	Bone fragments:									
	From fractured upper jaw	....	....	1	.....	1	.....	1	....	....
	From fractured frontal bone.	....	....	1	.....	1	.....	1	....	....
	Cyst (dentigerous)	....	....	.....	1	1	.....	1	....	....
	Cyst of upper jaw	....	....	.....	1	1	.....	1	....	....
	Cyst of femur	....	....	.....	1	1	.....	1	....	....
	Epulis and teeth	....	....	.....	2	2	.....	2	....	....
	Keloids of face	....	....	2	.....	2	.....	2	....	....
	Foreign body:									
	Bladder (calculi)	....	....	1	1	2	.....	1	....	1
	Esophagus	....	....	5	4	9	9	.....	....	....
	Eye	....	....	3	2	5	5	.....	....	....
	Ear	....	....	.....	2	2	2	.....	....	....
	Finger	....	....	6	5	11	11	.....	....	....
	Foot	....	....	3	2	5	5	.....	....	....
	Hand	....	....	3	8	11	9	2	....	....
	Knee	....	....	.....	1	1	1	.....	....	....
	Lane plate	....	....	.....	2	2	.....	2	....	....
	Rectum	....	....	1	.....	1	.....	1	....	....
	Scrotum	....	....	1	.....	1	1	.....	....	....
	Thigh	....	....	3	1	4	4	.....	....	....
Tumor	Tumor of umbilicus	....	....	.....	1	1	1	.....	....	....
Suturing	Incised wound:									
	Arm	1	....	3	4	8	.....	8	....	....
	Abdominal wall	....	....	1	.....	1	.....	1	....	....
	Back	....	....	3	1	4	.....	4	....	....
	Chest	....	....	1	1	2	.....	2	....	....
	Chin	1	....	2	.....	3	.....	3	....	....
	Face	8	....	30	8	46	.....	46	....	....
	Finger	6	....	21	5	32	.....	32	....	....
	Foot	2	....	6	2	10	.....	10	....	....
	Hand	5	....	32	9	46	.....	46	....	....
	Leg	....	....	2	.....	2	.....	2	....	....
	Lip	1	....	7	3	11	.....	11	....	....
	Neck	....	....	1	1	2	.....	2	....	....
	Scrotum	1	....	2	.....	3	.....	3	....	....
	Scalp	10	1	77	18	106	.....	106	....	....
	Tongue	....	....	1	.....	1	.....	1	....	....
	Thigh	....	....	.....	1	1	.....	1	....	....
	Perforated gastric ulcer	....	....	2	.....	2	.....	2	....	....

Operations and results, all patients—Continued.

Operation.	Diagnosis.	White.		Colored.		Total.	Recovered.	Improved.	Unimproved.	Died.
		Male.	Female.	Male.	Female.					
Stretching (nerve)	Sciatica			1		1	1			
Tenotomy	Contracture of tendo Achillis			1		1		1		
	Internal strabismus			1		1		1		
	Talipes equino varus			2	1	3		3		
Thyroidectomy	Exophthalmic goiter				3	3		3		
	Cystic goiter				4	4	3	1		
	Parenchymatous goiter			1	5	6	3	2		1
	Colloid goiter				2	2		2		
	Adenomatous goiter			1		1	1			
Tonsillectomy	Hypertrophied faucial tonsils			136	228	364	330	34		
	Lingual varices			15	15	30	30			
Trachelorrhophy	Lacerated cervix				15	15	15			
Trephine	Glaucoma			1	6	7		7		
Transfusion	Anemia				1	1		1		
Turbinectomy	Hypertrophied turbinates			7	5	12		12		
Wiring of bone	Fracture:									
	Femur			2	2	4		4		
	Jaw			3		3		3		
Total		68	10	1,285	1,714	3,077	1,474	1,496	41	66

Obstetrical record, except pay patients.

Month.	White.		Colored.		Total.	Eclampsia.	Cæsarian section.	Podalic version.	Lacerations.	Post-partum hemorrhage.	Stillbirths.	Twins.	Head.	Breech.	Foot.	Forceps.	Primipara.	Multipara.
	Male.	Female.	Male.	Female.														
July			14	15	29				15	3	1		27	1	1		14	15
August			13	10	23				6		3	1	22		1		16	6
September			12	15	27	1	2		9	1	2		26	1			18	9
October			15	14	29				4	3	1	1	27	1	1		14	14
November			11	12	23				9	2	1		23				16	7
December			19	9	28				12	4	3		27	1			14	14
January			12	23	35				15	7	2	1	32		3		19	15
February			10	19	29				13	2	3	1	29			1	16	12
March			19	19	38				14		4	1	38				22	15
April			13	19	32	1	1		8	4	2	1	32				21	10
May			18	11	29	1	1		14		3		27			1	20	9
June			13	16	29		1		8		2	2	24	3	2		11	16
Total			169	182	351	3	5		127	26	27	8	334	7	8	2	201	142

Anesthetics, all patients.

	Admitted.				Total.
	White.		Colored.		
	Male.	Female.	Male.	Female.	
General anesthetics:					
Ether	4	5	578	1,282	1,869
Chloroform	1			1	2
Chloroform and ether		1			1
Nitrous oxide and ether			12	2	14
Cocaine and ether			3		3
Local anesthetics:					
Ethyl chloride			6	5	11
Cocaine	1	1	90	45	137
Novocaine			3	6	9
Quinine and urea hydrochloride	1		1		2
Total	7	7	693	1,341	2,048

Pathological and X-ray laboratories.

RADIOGRAPHS.

	1917	1916		1917	1916
Abdomens	162	97	Kidneys and ureters	29	47
Chests	184	191	Knees	84	82
Elbows	49	43	Shoulders	35	58
Feet and ankles	76	81	Spines	22	.....
Femurs	35	36	Tibias and fibulas	47	55
Forearms	16	9	Hands and wrists	64	82
Heads	116	105			
Hips and pelves	45	66	Total	981	1,006
Humeri	17	.....			

X-RAY LABORATORIES.

Disease.	Cases.	Treatments.	Cured.	Improved.	Unimproved.	Unknown.
Post-operative carcinomas	5	13	.....	.....	1	4
Inoperable carcinoma (bladder)	1	1	.....	.....	1	.....
Metastatic carcinoma (spine)	1	1	.....	.....	1	.....
Keloids	9	35	4	4	.....	1
Tinea cercinata	1	1	.....	1	.....	.....
Tuberculosis adenitis	5	24	5	.....	.....	.....
Post-operative sarcoma (forearm)	1	6	.....	.....	.....	1
Eczema (hands)	1	1	.....	.....	.....	1
Scrofula derma	1	3	.....	1	.....	.....
Papilloma (finger)	1	1	.....	.....	.....	1
Total	26	86	9	6	3	8

PATHOLOGICAL LABORATORY.

	1917	1916		1917	1916
Red counts	72	.....	Autopsies	24	21
White counts	247	.....	Museum specimens	20	35
Hemaglobin estimate	83	86	Sputum examinations	76	73
Widall reactions	48	65	Urinalyses	1,638	1,744
Malarial examinations	8	4	Noguchi reactions	1,619	1,174

Total number, 426, or 26.18 per cent.
Total number, 1,171, or 72.3 per cent.
Total number, 22, or 1.34 per cent.
Total number A. C., 2, or 0.12 per cent.

Five hundred and thirty-three, or about one-third of these cases, came from the dispensary.

Numerous examinations of gastric contents, feces, bacteriological smears and cultures, differential counts, blood culture, coagulation estimates and preparations of vaccine not recorded were made and are not enumerated above.

Nativities, except pay patients.

Nativities.	White.		Colored.		Nativities.	White.		Colored.	
	Male.	Female.	Male.	Female.		Male.	Female.	Male.	Female.
Alabama	....	....	6	8	Ohio	....	....	3	2
Arkansas	....	....	2	.....	Oklahoma	....	....	1	.....
Colorado	1	....	.....	1	Pennsylvania	....	1	16	12
Connecticut	....	....	3	2	Rhode Island	....	....	2	1
Delaware	....	....	.....	2	South Carolina	....	....	32	38
District of Columbia	14	3	506	657	Tennessee	....	....	12	6
Florida	....	....	5	2	Texas	....	....	2	1
Georgia	....	....	16	20	Virginia	8	2	410	716
Illinois	....	....	2	2	West Virginia	2	....	10	12
Indiana	....	....	2	4	Wisconsin	2	....	.....	.....
Iowa	....	....	.....	2	British West Indies	....	....	10	4
Kansas	....	....	2	.....	Canada	1	....	.....	.....
Kentucky	....	....	10	4	Cuba	....	....	1	.....
Louisiana	....	1	3	.....	Germany	....	....	1	.....
Maryland	8	2	288	401	Italy	2	....	.....	.....
Massachusetts	2	....	4	.....	Panama	....	....	.....	1
Michigan	....	....	2	1	Russia	2	....	.....	.....
Mississippi	....	....	2	2	South America	....	....	1	.....
Missouri	....	....	4	2	Unknown	3	....	12	10
New Jersey	....	....	3	6					
New York	....	....	6	2	Total	45	9	1,457	2,000
North Carolina	....	....	78	79					

Occupation, except pay patients.

Occupations.	White.		Colored.		Occupations.	White.		Colored.	
	Male.	Female.	Male.	Female.		Male.	Female.	Male.	Female.
Actor	....	....	1	.....	Manicurist	....	....	.....	1
Actress	....	....	.....	1	Mason	....	....	1	.....
Agent	1	....	5	.....	Mechanic	2	....	2	.....
Baker	3	....	6	.....	Merchant	1	....	1	.....
Bellman	....	....	5	.....	Midwife	....	....	.....	1
Blacksmith	....	....	2	.....	Miner	....	....	1	.....
Boxmaker	1	....	.....	.....	Minister	....	....	4	.....
Butcher	2	....	.....	.....	Messenger	2	....	8	.....
Butler	....	....	5	.....	Motorman	1	....	.....	.....
Carpenter	2	....	8	.....	Musician	....	....	2	.....
Chauffeur	1	....	24	.....	No occupation	6	2	354	395
Clerk	2	....	2	.....	Nursemaid	....	1	.....	41
Cook	....	....	25	51	Orderly	....	....	6	.....
Domestic	....	1	.....	954	Painter	1	....	4	.....
Dressmaker	....	1	.....	44	Pharmacist	....	....	1	.....
Driver	....	....	28	.....	Physician	....	....	2	.....
Elevatorman	....	....	8	.....	Plasterer	....	....	1	.....
Engineer	1	....	3	.....	Plumber	....	....	2	.....
Expressman	....	....	2	.....	Porter	....	....	52	.....
Farmer	1	....	30	.....	Salesman	....	....	1	.....
Fireman	1	....	2	.....	Shoemaker	....	....	2	.....
Fisherman	....	....	1	.....	Soldier	2	....	4	.....
Gardener	2	....	2	.....	Stenographer	....	....	1	.....
Guide	....	....	1	.....	Student	2	....	190	150
Hairdresser	....	....	.....	6	Tailor	....	....	10	.....
Hostler	....	....	4	.....	Tinner	1	....	.....	.....
Housewife	....	2	.....	162	Undertaker	....	....	1	.....
Housekeeper	....	2	.....	34	Upholsterer	....	....	6	.....
Huckster	....	....	8	.....	Waiter	....	....	47	14
Janitor	1	....	20	.....	Valet	....	....	1	.....
Laborer	8	....	556	.....					
Laundress	....	....	.....	146	Total	45	9	1,457	2,000
Machinist	1	....	5	.....					

Nativities, pay patients, except births.

Nativities.	White.		Colored.		Nativities.	White.		Colored.	
	Male.	Female.	Male.	Female.		Male.	Female.	Male.	Female.
Alabama	....	....	1	.....	Pennsylvania	....	1	2	2
California	1	....	.....	.....	South Carolina	....	....	6	11
Connecticut	....	....	.....	1	Tennessee	....	....	.....	3
District of Columbia	1	1	27	60	Texas	....	....	1	3
Delaware	....	....	.....	1	Virginia	....	....	32	63
Florida	....	....	.....	1	West Virginia	....	....	1	2
Georgia	....	....	2	1	Wyoming	....	....	.....	1
Kentucky	....	....	2	1	Austria	....	....	.....	1
Louisiana	....	....	.....	3	British Guiana	....	....	2	.....
Maryland	....	....	9	26	British West Indies	....	....	.....	2
Massachusetts	....	....	.....	2	Canada	....	....	1	1
Mississippi	....	....	.....	3	Ireland	1	....	.....	.....
Missouri	....	....	.....	3	Vancouver	....	....	.....	*1
Nebraska	....	....	.....	1	Unknown	4	5	11	10
New York	....	....	2	2					
North Carolina	....	....	10	9	Total	7	7	110	215
Ohio	....	....	1	1					

Occupations, pay patients, except births.

Occupations.	White.		Colored.		Occupations.	White.		Colored.	
	Male.	Female.	Male.	Female.		Male.	Female.	Male.	Female.
Agent	....	....	4	.....	Laundress	....	....	.....	3
Banker	....	....	2	.....	Maid	....	....	.....	6
Barber	....	....	3	.....	Manicurist	....	....	.....	1
Bellman	....	....	1	.....	Mechanic	....	....	1	.....
Bricklayer	....	....	1	.....	Merchant	1	....	2	.....
Brick mason	....	....	1	.....	Messenger	....	....	5	.....
Butler	....	....	1	.....	Musician	....	....	.....	1
Carpenter	....	....	1	.....	Nurse	....	....	.....	2
Chauffeur	....	....	1	.....	Operator	....	....	.....	1
Cigar maker	....	....	1	.....	Physician	....	....	3	.....
Clerk	....	....	5	.....	Plasterer	....	....	1	.....
Cook	....	....	.....	3	Policeman	....	....	1	.....
Copyist	....	....	.....	1	Porter	....	....	2	.....
Domestic	....	....	1	39	Preacher	....	....	2	.....
Dressmaker	....	....	.....	7	Proprietor	....	....	1	1
Dyer	....	....	1	.....	Seamstress	....	....	.....	1
Electrician	....	....	1	.....	Sexton	....	....	1	.....
Elevatorman	....	....	2	.....	Shoemaker	....	....	1	.....
Farmer	....	....	4	.....	Student	1	....	10	7
Fireman	....	....	1	.....	Teacher	....	....	3	12
Hairdresser	....	....	.....	3	Valet	....	....	1	.....
Housekeeper	....	....	.....	20	Waiter	....	....	6	.....
Housemaid	....	....	.....	1	Watchman	....	....	1	.....
Housewife	....	1	.....	73	Unknown	4	6	29	33
Huckster	....	....	1	.....					
Janitor	....	....	2	.....	Total	7	7	110	215
Laborer	1	....	6	.....					

OUTDOOR SERVICE.

The following tables show the number of medical and surgical diseases treated in the outdoor service:

Medical and surgical diseases—out-patient department.

Diagnosis.	White.		Colored.		Total.
	Male.	Female.	Male.	Female.	
Medical.					
Adenitis, tuberculous	1	....	17	10	28
Alcoholism	....	1	21	13	35
Aneurysm	....	....	21	35	56
Anemia	....	....	21	35	56
Arteriosclerosis	3	....	67	40	110
Asthma, bronchial	....	....	18	9	27
Autointoxication, intestinal	1	1	41	17	60
Bronchitis:					
Acute	5	4	127	99	235
Chronic	....	....	35	41	76
Cardiac diseases:					
Aortic insufficiency	....	....	13	5	18
Mitral insufficiency	....	....	41	31	72
Myocarditis	....	....	11	7	18
Cardiac neurosis	....	....	14	9	23
Cerebral hemorrhage	....	....	3	2	5
Constipation	1	1	60	95	157
Coryza	....	....	35	27	62
Cystitis	....	....	3	2	5
Debility, senile	....	....	14	17	31
Diarrhea	....	....	30	35	65
Diabetes, mellitus	....	....	6	2	8
Endocarditis	....	....	5	4	9
Enteritis	....	....	17	30	47
Gastritis:					
Acute	....	....	31	22	53
Chronic	....	....	24	38	62
Gastro-enteritis	1	3	10	2	16
Gastric ulcer	....	1	14	5	20
Hemorrhoids	....	....	9	14	23
Hepatitis	....	....	3	2	5
Hysteria	....	....	....	11	11
Indigestion:					
Gastric	2	....	28	41	71
Intestinal	1	1	13	30	45
Influenza	2	....	20	19	41
Laryngitis	....	....	12	17	29
Lumbago	3	....	22	13	38
Malaria	....	....	6	7	13
Menopause	....	....	....	35	35
Migraine	1	2	8	30	41
Myositis	....	....	4	5	9
Nephritis:					
Acute	....	....	11	4	15
Chronic	2	1	38	17	58
Neuralgia:					
Facial	1	....	4	5	10
Intercostal	....	....	18	7	25
Neurasthenia	....	....	8	7	15
Neuritis	....	....	6	10	16
Parotitis	....	....	2	5	7
Pharyngitis	1	1	19	26	47
Pleurodynia	....	....	5	8	13
Pleuritis	2	1	17	16	36
Pneumonia, lobar	....	....	6	1	7
Pregnancy, hyperemesis of	....	....	....	18	18
Rheumatism:					
Acute articular	....	....	15	17	32
Chronic articular	....	....	8	9	17
Muscular	1	....	58	96	155
Syphilis	....	....	15	11	26
Tonsillitis	....	....	19	17	36
Tuberculosis, pulmonary	....	....	18	14	32
Undiagnosed	....	....	101	115	216
Total	28	17	1,192	1,259	2,496
Revisits	....	....	....	....	4,511
Gynecology.					
Abscess, vulvo-vaginal	....	....	....	10	10
Adenitis, inguinal	....	....	....	14	14
Adhesions, post-operative	....	....	....	15	15
Carcinoma, uterus	....	....	....	7	7

Diagnosis.	White.		Colored.		Total.
	Male.	Female.	Male.	Female.	
Gynecology—Continued.					
Caruncle, urethral	....	....	....	2	2
Chancroids	....	....	....	12	12
Condylomata, vulval	....	....	....	19	19
Cystocele	....	....	....	35	35
Cysts, ovarian	....	....	....	37	37
Cystitis	....	....	....	28	28
Dysmenorrhea	....	....	....	45	45
Endocervicitis	....	....	....	18	18
Endometritis	....	....	....	5	5
Fibroma uteri	....	....	....	23	23
Lacerations:					
Cervix	....	....	....	49	49
Perineum	....	....	....	61	61
Leucorrhea	....	....	....	35	35
Miscarriage	....	....	....	11	11
Menopause	....	....	....	17	17
Menorrhagia	....	....	....	27	27
Metrorrhagia	....	....	....	17	17
Pregnancy	....	....	....	51	51
Pyosalpinx	....	....	....	15	15
Retained secundines	....	....	....	5	5
Salpingitis	....	....	....	69	69
Syphilis	....	....	....	8	8
Uterine displacements:					
Antiversion	....	....	....	11	11
Prolapse	....	....	....	15	15
Retroflexion	....	....	....	30	30
Retroversion	....	....	....	27	27
Vaginitis	....	....	....	12	12
Undiagnosed	....	....	....	47	47
Total	....	....	....	777	777
Revisits	....	....	....	....	2,318
Ear, nose, and throat.					
Abscess:					
Ear, external	....	....	4	1	5
Nose, septum	....	....	3	2	5
Peritonsilar	....	....	17	9	26
Adenoids	....	....	40	49	89
Cerumen, impacked	2	1	15	10	28
Eczema:					
Ear	....	....	5	4	9
Nares	....	....	2	1	3
Edema glottis	....	....	2	1	3
Epistaxis	....	....	15	21	36
Eustachian tube, catarrh of	....	2	9	7	18
Foreign body:					
Ear	1	....	2	1	4
Nose	....	....	3	1	4
Throat	....	....	7	11	18
Gumma of palate	....	....	5	2	7
Laryngitis:					
Acute	....	....	27	13	40
Chronic	....	....	30	32	62
Specific	....	....	7	6	13
Naso-pharyngitis	....	1	15	9	25
Nasal septum, deflection of	....	....	2	1	3
Olatgia	....	....	....	....	....
Otitis externa	....	....	5	7	
Otitis media:					
Acute	....	....	11		
Chronic	....	....	21	7	8
Pharyngitis:					
Acute	2	1	29	37	69
Chronic	....	....	17	18	35
Specific	....	....	12	14	26
Rhinitis:					
Acute	....	....	7	9	16
Atropic	....	....	3	4	7
Hypertrophic	....	....	5	7	12
Luetic	....	....	5	1	6

Medical and surgical diseases—out-patient department—Continued.

Diagnosis.	White.		Colored.		
	Male.	Female.	Male.	Female.	Total.
Ear, nose, and throat—Continued.					
Sinusites, frontal	....	....	2	.....	2
Tonsils, hypertrophy of	....	....	.....	.....	.....
Faucial	....	....	70	62	132
Lingual	....	....	4	7	11
Tonsillitis:					
Acute	....	....	45	17	62
Chronic	....	....	12	16	28
Follicular	....	....	29	31	60
Luetic	....	....	7	3	10
Tracheitis	....	....	4	2	6
Turbinate bones, hypertrophy of	....	....	7	9	16
Ulcers:					
Nasal septum	....	....	1	3	4
Tongue	....	....	2	.....	2
Uvula	....	....	1	1	2
Undiagnosed	....	....	37	29	66
Total	5	5	546	494	1,050
Revisits	....	....	.....	.....	1,716
Eye.					
Abscess, lid	....	....	3	2	5
Ambylopia	....	....	5	8	13
Angio-sclerosis	....	....	2	5	7
Aphakia	....	....	2	8	10
Arterio-sclerosis	....	....	7	9	16
Atrophy, optic	....	....	7	3	10
Astigmatism:					
Hyperopic	....	....	18	19	37
Myopic	....	....	6	7	13
Blepharitis	....	1	9	17	27
Cataract	....	....	12	21	33
Chalazion	....	....	30	16	46
Circumcorneal opacity	....	....	3	9	12
Choroiditis	....	....	6	12	18
Choroido-iritis	....	....	5	7	12
Choroido-retinitis	....	....	17	9	26
Conjunctivitis:					
Catarrhal	....	....	10	11	21
Follicular	....	....	29	35	64
Phlyctenular	....	....	15	17	32
Purulent	....	....	5	9	14
Cacri-cystitis	....	....	5	7	12
Ecchymosis, conjunctival	....	....	7	5	12
Eczema of lids	....	....	3	4	7
Oedema of retina	....	....	.....	5	5
Entropion	....	....	4	3	7
Foreign body in eye	2	1	19	21	43
Glaucoma	....	....	3	4	7
Hordeoleum	....	....	13	25	38
Iritis	....	....	15	31	46
Keratitis	....	....	9	14	23
Kerato-iritis	....	....	15	19	34
Leukoma	....	....	2	1	3
Myopia	....	....	10	15	25
Neuro-retinitis	....	....	35	41	76
Ophthalmia, purulent	....	....	10	9	19
Presbyopia	....	....	15	17	32
Refraction	....	1	125	93	219
Retinitis	....	....	12	30	42
Strabismus	....	....	5	4	9
Trauma of eye	....	....	8	2	10
Ulcer, corneal	....	....	5	4	9
Ulcer, marginal	....	....	12	3	15
Vernal cartarrh	....	....	11	18	29
Undiagnosed	....	....	60	69	129
Total	2	3	594	668	1,267
Revisits	....	....	.....	.....	2,720

Diagnosis.	White.		Colored.		
	Male.	Female.	Male.	Female.	Total.
Pediatrics.					
Adenoids	1	2	14	15	32
Adenitis, tuberculous	....	....	12	17	29
Auto-intoxication	1	7	15	20	43
Bronchitis:					
Acute	1	1	20	27	49
Chronic	....	....	15	17	32
Constipation	....	....	18	22	40
Croup	....	....	.....	5	5
Cystitis	....	....	2	1	3
Dentition	....	....	11	15	26
Dermatitis	....	....	13	18	31
Diarrhea	....	1	40	45	86
Eczema	....	....	5	8	13
Enteritis	....	....	10	14	24
Entero-colitis	....	....	30	29	59
Herpes	....	....	4	5	9
Hernia:					
Inguinal	....	....	2	1	3
Umbilical	....	....	14	12	26
Hyperthyroidism	....	....	.....	3	3
Hydrocele	....	....	1	.....	1
Gastritis	....	....	11	9	20
Gastro-enteritis	....	....	19	17	36
Gleo-colitis	....	....	3	2	5
Intestinal worms	....	....	19	13	32
Laryngitis	....	....	3	4	7
Lues, congenital	....	....	12	14	26
Marasmus:					
Tuberculous	....	....	15	8	23
Syphilitic	....	....	3	2	5
Otitis media	....	....	8	7	15
Ophthalmia	....	....	5	4	8
Pertussis	....	....	11	11	22
Pharyngitis	....	....	27	24	51
Phimosis	....	....	12	.....	12
Pneumonia:					
Bronchial	....	....	3	2	5
Lobar	....	....	1	.....	1
Rachitis	....	....	21	25	46
Rhinitis	....	....	8	6	14
Scabies	....	....	5	6	11
Stomatitis	....	....	12	15	27
Talipes	....	....	3	1	4
Tinea	....	....	11	9	20
Tonsillitis	....	....	25	30	55
Tuberculosis, pulmonary	....	....	3	1	4
Vaginitis	....	....	.....	5	5
Vaccination	....	....	12	14	26
Undiagnosed	....	....	15	23	38
Total	3	5	493	526	1,027
Revisits	....	....	.....	.....	711
Dermatology.					
Abrasions	....	....	4	3	7
Acne	....	....	19	11	30
Acne, vulgaris	....	....	26	20	46
Adenitis, cervical	....	....	4	4	8
Alopecia areata	....	....	4	1	5
Condylomata, luetic	....	....	3	9	12
Dermatitis, calonca	....	....	5	3	8
Medicamenta	....	....	8	4	12
Venenata	1	....	3	5	9
Ecthyma	....	....	2	.....	2
Eczema	....	....	35	21	56
Erythema	....	....	2	5	7
Furunculosis	....	....	1	2	3
Herpes	2	1	5	8	16
Herpes zoster	....	....	2	.....	2
Impetigo	....	....	4	5	9
Impetigo contagiosa	....	1	5	3	3
Keratosis pigmentary	1	....	1	1	9

Medical and surgical diseases—out-patient department—Continued.

Diagnosis.	White.		Colored.		
	Male.	Female.	Male.	Female.	Total.
Dermatology—Continued.					
Lentigo	....	1	....	10	11
Leukoderma	....	....	4	3	7
Lichen planus	....	....	3	2	5
Lupus	....	....	1	3	4
Pediculosis capiti	1	....	3	5	9
Pediculosis corpori	....	....	4	....	4
Pernio	....	....	5	2	7
Pityriasis	....	....	10	12	22
Pruritus	....	....	9	8	17
Scabies	....	....	21	18	39
Seborrhea	....	....	9	5	14
Syphilis:					
Secondary	....	....	15	22	37
Tertiary	....	....	5	8	13
Sycosis	1	....	5	....	6
Tinea:					
Circinata	....	....	8	3	11
Tonsurans	2	....	17	....	19
Urticaria	....	1	19	11	31
Varicella	....	....	5	4	9
Verruca	1	1	3	4	9
Undiagnosed	....	....	15	17	32
Total	9	5	294	242	550
Revisits	....	....	....	....	630
Orthopedic.					
Ankylosis:					
Elbow	....	....	2	....	2
Hip	....	....	3	1	4
Knee	....	....	2	1	3
Arthritis:					
Gonorrheal	....	....	10	6	16
Hypertrophic	....	....	2	1	3
Infectious	....	....	8	7	15
Villons	....	....	3	2	5
Bursitis, subacromial	....	....	8	3	11
Dislocations:					
Semilunar cartilage	....	....	1	3	4
Shoulder	....	....	1	....	1
Fractures:					
Colles's	....	....	4	1	5
Femur	....	....	....	2	2
Foot	....	....	1	1	2
Genu valgum	....	....	3	3	6
Genu varum	....	....	4	2	6
Infantile paralysis	....	....	2	2	4
Osteomyelitis	....	....	5	7	12
Periostitis	....	....	4	4	8
Pes planus	....	....	11	21	32
Sacro-iliac relaxation	....	....	17	14	31
Scoliosis	....	....	5	7	12
Sprains of joints	....	....	12	9	21
Synovitis	....	....	3	2	5
Torticollis	....	....	3	3	6
Tuberculosis:					
Ankle	....	....	1	2	3
Hip	....	....	1	1	2
Knee	....	....	4	2	6
Spine	....	....	3	1	4
Wrist	....	....	1	1	2
Undiagnosed	....	....	18	14	32
Total	....	....	142	123	265
Revisits	....	....	....	....	319
Neurology.					
Alcoholism	1	1	3	....	5
Aphasia	....	....	1	1	2
Apraxia	....	....	1	....	1
Arterial hypertension	....	....	18	12	30
Bell's palsy	....	....	2	4	6

Diagnosis.	White.		Colored.		
	Male.	Female.	Male.	Female.	Total.
Neurology—Continued.					
Cerebral tumor	....	....	....	1	1
Epilepsy	....	....	7	3	10
Hemiplegia	....	....	5	2	7
Hyperthyroidism	....	....	....	3	3
Hysteria	....	....	....	9	9
Neuralgia trigeminal	....	....	14	15	29
Neurasthenia	....	....	5	7	12
Neuritis	....	....	4	4	8
Polyneuritis	....	....	3	2	5
Sciatica	....	....	1	1	2
Spinal sclerosis	....	....	5	6	11
Tabes dorsalis	....	....	11	5	16
Undiagnosed	....	....	11	9	20
Total	1	1	91	84	177
Revisits	....	....	....	....	349
Minor surgery.					
Abscess:					
Hand	1	....	12	4	17
Neck	....	....	4	3	7
Cellulitis:					
Arm	....	....	2	2	4
Hand	....	....	5	7	12
Neck	....	....	3	3	6
Cysts, sebaceous	....	....	10	5	15
Dislocations, shoulder	....	....	3	....	3
Fractures:					
Colles's	....	....	4	2	6
Forearm	....	....	2	2	4
Foreign body:					
Hand	....	....	5	2	7
Foot	....	....	5	2	7
Throat	....	....	3	1	4
Ingrowing toenail	....	....	6	7	13
Prepatella bursa	....	....	2	....	2
Vaccinations	....	....	151	160	311
Total	1	....	217	200	418
Surgical dressings	....	....	....	....	2,971
Genitourinary.					
Abscess:					
Perineal	....	....	8	....	8
Scrotal	....	....	1	....	1
Adenitis, inguinal	....	....	42	....	42
Chancre	....	....	22	....	22
Chancroid	....	....	31	....	31
Condylomata	....	....	11	....	11
Epididymitis	....	....	31	....	31
Phimosis	....	....	25	....	25
Prostate, hypertrophy of	....	....	14	....	14
Prostatitis	....	....	5	....	5
Stricture of urethra	....	....	37	....	37
Syphilis, secondary	....	....	32	....	32
Tuberculosis:					
Bladder	....	....	3	....	3
Kidney	....	....	5	....	5
Prostate	....	....	3	....	3
Urethritis:					
Anterior	....	....	135	....	135
Posterior	....	....	130	....	130
Gonorrheal	....	....	50	....	50
Venereal warts	....	....	5	....	5
Total	....	....	590	....	590
Revisits	....	....	....	....	1,719
Tuberculosis.					
Pulmonary tuberculosis	....	....	27	32	59
Revisits	....	....	....	....	119

Statistical summary, all patients.

	1917					1916				
	White.		Colored.			White.		Colored.		
	Male.	Female.	Male.	Female.	Total.	Male.	Female.	Male.	Female.	Total.
In hospital July 1, 1915	....	....	.....	.....	.....	3	2	65	111	181
In hospital July 1, 1916:										
Pay patients	....	....	3	8	11	....	....	.....	.....	.....
Indigent—										
United States	2	2	42	65	111	....	....	.....	.....	.....
District of Columbia	....	....	38	55	93	....	....	.....	.....	.....
Total	2	2	83	128	215	3	2	65	111	181
Admitted:										
Pay patients	6	3	112	218	339	6	6	97	174	283
Pay patients, births	....	....	12	24	36	....	....	6	10	16
Indigent—										
United States	18	6	644	854	1,522	15	3	570	743	1,331
District of Columbia	27	3	660	975	1,665	18	6	576	996	1,596
Births—										
United States	....	....	70	91	161	....	....	59	46	105
District of Columbia	....	....	83	80	163	....	....	78	82	160
Total admitted	51	12	1,581	2,242	3,886	39	15	1,386	2,051	3,491
Total under care indoor	53	14	1,664	2,370	4,101	42	17	1,451	2,162	3,672
Stillbirths:										
Pay patients	....	....	1	.....	1	....	....	.....	.....	.....
Indigent	....	....	16	11	27	....	....	15	17	32
Total	....	....	17	11	28	....	....	15	17	32
Deaths:										
Pay patients	....	1	9	19	29	1	....	8	10	19
Indigent	2	....	145	136	283	2	....	128	121	251
Total	2	1	154	155	312	3	....	136	131	270
Discharged, including births:										
Pay patients—										
Recovered	....	....	.....	.....	207	....	....	.....	.....	135
Improved	....	....	.....	.....	93	....	....	.....	.....	130
Unimproved	....	....	.....	.....	13	....	....	.....	.....	4
Not treated	....	....	.....	.....	28	....	....	.....	.....	15
Total	....	....	.....	.....	341	....	....	.....	.....	284
Indigent—										
Recovered	....	....	.....	.....	1,786	....	....	.....	.....	1,371
Improved	....	....	.....	.....	1,181	....	....	.....	.....	1,323
Unimproved	....	....	.....	.....	229	....	....	.....	.....	207
Not treated	....	....	.....	.....	7	....	....	.....	.....	15
Total	....	....	.....	.....	3,203	....	....	.....	.....	2,903
Grand total discharged	....	....	.....	.....	3,856	....	....	.....	.....	3,457
In hospital July 1, 1917:										
Pay patients	....	....	3	13	16	....	....	3	8	11
Indigent—										
United States	1	1	60	85	147	2	2	42	65	111
District of Columbia	....	....	25	57	82	....	....	38	55	93
Total indigent	1	1	85	142	229	2	2	80	120	204
Grand total remaining	1	1	88	155	245	2	2	83	128	215
Days maintenance:										
Pay patients	....	....	.....	.....	5,348	....	....	.....	.....	4,433
Indigent—										
United States	....	....	.....	.....	43,883	....	....	.....	.....	39,504
District of Columbia	....	....	.....	.....	35,487	....	....	.....	.....	34,902
Officers and employees	....	....	.....	.....	38,584	....	....	.....	.....	38,399
Total	....	....	.....	.....	123,302	....	....	.....	.....	117,238

Statistical summary, all patients—Continued.

	1917					1916				
	White.		Colored.			White.		Colored.		
	Male.	Female.	Male.	Female.	Total.	Male.	Female.	Male.	Female.	Total.
Cost of patients per day					$1,216					$1,285
Largest number of indigent patients at any one time					254					228
Smallest number of indigent patients at any one time					175					167
Daily average number of patients, pay and indigent					232.1					213.3
Number admitted from District of Columbia, including births, indigent					1,828					1,756
Number admitted from United States, including births, indigent					1,683					1,436
Number of prescriptions compounded:										
Indoor					30,164					
Outdoor					11,907					

FINANCIAL STATEMENTS.

BOARD OF CHARITIES ACCOUNT.

July 1, 1916, to June 30, 1917.

	Adults.	Children.	Babies.	Total.
In hospital July 1, 1916	75	13	5	93
Admitted	1,465	199	164	1,828
Total	1,540	212	169	1,921

Appropriation	$35,000.00
Bills rendered	35,000.00

ALLOTMENT OF APPROPRIATION FOR SALARIES.

[Under requirement of act of Congress approved June 25, 1909 (35 Stat., 992).]

	Per annum.
Surgeon in chief	$3,000
Assistant surgeon	1,500
Resident physician	1,200
Pathologist	2,000
Anæsthetist	1,200
Clerk	1,400
Assistant clerk (1)	700
Assistant clerk (1)	636
Pharmacist	720
Assistant pharmacist	120
Steward	720
Superintendent of nurses	1,080
Assistant superintendent of nurses	600
Night supervisor of nurses	480
Head nurses (2 at $480)	960
Engineer	1,200
Assistant engineer	1,000
Assistant engineer	900
Plumber	900
Firemen (3 at $720)	2,160
Seamstress	$300
Nurses (48 at $60)	2,880
Orderlies (2 at $300)	600
Orderlies (4 at $240)	960
Night orderly	276
Maids (3 at $168)	504
Head cook	540
Second cook	360
Third cook	288
Waiters (3 at $156)	468
Driver	408
Driver	360
Laundryman	420
Laundresses (5 at $156)	780
Laborer	240
Laborer	204
Laborer	216
Laborers (2 at $180)	360
Total	32,640

RECEIPTS AND DISBURSEMENTS.

RECEIPTS.

Appropriation, sundry civil act:		
For support	$28,000.00	
Salaries	32,640.00	
		$60,640.00
Appropriation, District of Columbia (under contract with Board of Charities)	35,000.00	
Pay patients	7,382.90	
		42,382.90
Total		103,022.90

DISBURSEMENTS.

Miscellaneous:		
Fuel, light, clothing, forage, medicine, etc	$32,131.12	
Pay patients	2,079.40	
Subsistence	30,770.02	
Pay patients	2,691.48	
Salaries	32,558.79	
Pay patients	2,275.16	
Refunds, pay patients	311.25	
		102,817.22
		205.68

Miscellaneous expenditures.

Class No.		1917	1916	Class No.		1917	1916
1	Stationery and drafting supplies	$400.00	$397.69	11	Forage and seed	$271.54	$249.00
2	Hardware and metals:			12	Photographic supplies	95.90	299.43
	Hardware	333.31	282.16	14	Fuel:		
	Metals	60.82	39.19		Charcoal	12.82	13.84
3	Dry goods and wearing apparel, cordage	2,172.02	2,417.06		Coal, anthracite	223.72	221.40
4	Drugs and medicines:				Coal, bituminous	14,108.00	12,226.90
	Chemicals and reagents	3,886.97	4,229.00		Wood	45.00	52.08
	Wines and whisky	87.24	156.53	15	Incandescent electric lamps	52.14	157.47
5	Laboratory, hospital appliances, surgical instruments, etc.:				Heat, light, and power service:		
	Laboratory	545.05	185.91		Gas	952.30	950.13
	Hospital appliances	2,710.72	2,660.06		Hauling ashes	502.28	439.04
	Surgical instruments	530.85	581.34		Telephone service	471.29	473.03
6	Electrical, engineering, and plumbing supplies	647.56	763.13		Telegrams	5.91	4.16
7	Lumber, millwork, and building material	26.10	55.09		Books and periodicals	45.75	38.50
8	Paints, oils, brushes, etc.:				Sundries (unclassified miscellaneous)	955.25	662.89
	Brushes	37.95	92.32		Repairs and construction:		
	Oils, paints, and painters' supplies	262.98	676.85		Repairs—		
9	Furniture and floor covering	9.60	375.93		Buildings	545.23	785.05
10	Household supplies:				Grounds	14.00	717.99
	Cleaning	258.53	221.04		Instruments	127.70	228.34
	Laundry	769.60	1,010.41		Kitchen utensils	54.85	90.32
	Miscellaneous	420.30	656.08		Laundry	4.75	29.59
					Office	9.14	1.60
					Painting	50.00	547.00
					Stable	339.20	254.42
					Miscellaneous	52.25	519.88
					Construction	32.50	186.83
					Total	32,131.12	33,948.68

Subsistance expenditures.

Class No.		1917	1916
10	Beverages:		
	Chocolate	$5.20	.....
	Coffee	725.83	$360.05
	Cocoa	53.74	78.00
	Tea	175.00	162.94
	Canned goods	1,390.24	1,238.76
	Condiments and flavors	222.55	159.16
	Cereal food products:		
	Cornstarch	9.71	8.44
	Barley	5.98	6.48
	Bread	1,594.25	1,759.13
	Crackers and cakes	233.53	261.20
	Flakes, corn	81.00	84.60
11	Flour	292.05	247.26
10	Hominy, coarse	13.16	4.75
	Hominy grits	14.46	17.32
	Macaroni	19.17	17.90
	Meal, corn	39.96	29.87
	Oats, rolled	31.59	35.72
	Rice	59.22	64.33
	Tapioca	7.96	3.23
	Spaghetti	13.41	17.87
	Unclassified	166.29	144.41
	Dairy products:		
	Butter	4,223.37	2,992.00
	Buttermilk	121.05	116.60
	Cream	92.84	64.79
	Cheese	20.81	34.82
	Milk, fresh	2,850.62	3,113.28
	Eggs	1,753.82	1,322.70
	Fish:		
	Clam bouillon	18.25	14.60
	Herring	5.00	17.60
	Codfish	85.68	98.64
	Fresh	586.04	423.12
	Mackerel, salt	37.00	86.32
	Oysters	154.00	166.73
	Salmon	34.00	45.98
	Fowl:		
	Chicken	$2,102.90	$1,671.95
	Turkey	63.00	75.00
	Fruits	120.39	1,580.16
14	Ice	661.01	583.99
10	Lard, pure hog	207.66	412.14
	Meats:		
	Bacon—		
	Breakfast	396.99	500.76
	Shoulder	452.34	378.46
	Beef—		
	Fresh	2,786.14	3,211.48
	Corned	154.36	174.04
	Chipped	212.66	165.28
	Soup shanks	218.68	235.06
	Ham—		
	Smoked	445.77	519.94
	Lamb	1,126.48	1,171.39
	Liver	131.58	205.98
	Pork, fresh	266.38	277.71
	Sausage, smoked	111.25	147.65
	Veal	241.94	314.20
10	Saccharine products:		
	Molasses	6.96	4.70
	Sugar—		
	Granulated	1,546.72	1,659.20
	Powdered	5.25	1.56
	Brown	2.60	.....
	Sirup	23.25	15.12
	Salt	25.60	25.41
	Soft drinks, ginger ale	75.11	148.63
	Vegetables	4,248.22	2,165.61
	Total	30,770.02	28,844.02

Receipts and expenditures on account of pay patients.

	1917	1916
Receipts:		
Private room patients, at $1.25 per day	$5,503.75	$4,390.00
Ward patients, at $1.10 per day	561.00	845.90
Children, at 65 cents per day	173.55	109.20
Babies, at 40 cents per day	163.60	69.20
Operations	807.00	589.00
X-ray photos	136.00	70.00
Obstretical cases	25.00	.....
Examination of urine	.....	5.00
Examination of blood	13.00	.....
	7,382.90	6,078.30
Expenditures:		
Extra services (nurses, orderlies, maids)	2,275.16	2,067.50
Subsistence	2,691.48	1,634.24
Medical and surgical supplies	534.54	906.40
Miscellaneous (dry goods, repairs and improvements)	1,544.86	1,149.39
Refund of overpayments by patients	311.25	268.45
	7,357.29	6,025.98
Unexpended balance	25.61	52.32

NEEDS.

The recommendations concerning the several items enumerated in the last annual report of the hospital under this head as necessary for its full development, are respectfully renewed, the most important of which is the pathological building. With the onward march of medical science, the urgency for such a building increases year by year and it is earnestly hoped that Congress will make the necessary provision in the near future.

Additional sleeping accommodations for nurses should be made at an early date, not only to provide for a larger number for hospital purposes, but the time seems now opportune to train a greater number to meet the necessities of the war in which the country is now involved. Trained nurses will soon be needed as never before and in greatly increased numbers. It seems urgent, therefore, that training facilities for nurses should receive early consideration. It is suggested that the best and least costly way to provide ample quarters for a large number is to add another story to the present nurses' home.

An increase in the appropriation for the support of the hospital is of great importance. It is quite certain that all of the activities of the hospital can not be continued through the year on their present scale without creating a deficit. Last year the abnormally high cost of the necessaries of life bore very heavily upon us in the struggle to make ends meet, and the continued mounting prices of all articles used for hospital work make it quite certain that a deficiency appropriation will be needed to carry on this branch of the public service. During the current fiscal year, even with the greatest economy, it is estimated that the food supplies will cost approximately $8,000 more than last year, while the cost of fuel, medical or surgical supplies will be $6,000 more.

Provision should be made for a dietitian. In the care of the sick, it is important that there should be scientific care in the preparation of food and the prevention of waste. Under the present regulations, the food is prepared under the supervision of the steward, who, while doing his best, is not a skilled dietitian, and, of course, the results are not what they should be at all times.

Six thousand dollars are needed for repairs to the buildings and to provide new window curtains throughout the hospital.

TRAINING SCHOOL FOR NURSES.

The demand for service in this department of the hospital was unusually heavy on account of the increased number of patients under treatment. While the service rendered by the nurses was, on the whole, satisfactory, better results could be had if the number of nurses could be increased, so as to permit an eight-hour shift. This is regarded as very essential to efficient nursing as well as to the health of the nurses.

At the beginning of the year satisfactory arrangements were made whereby the senior class received special instruction in dietetics at Howard University. The intermediate class was given, in addition to their regular course of instruction, a course of lectures on public health nursing.

The graduating exercises were held in the Andrew Rankin Memorial Chapel, May 2, 1917, twenty-one nurses graduating, making a total of 298 holding certificates from the school.

Graduates, 1917.

Susie Miluard Boulding, Beaver Falls, Pa.
Irene Clinton Brown, Newark, N. J.
Josephine Matilda Butler, Hutchinson, Kans.
Alice Anne Chambers, Baltimore, Md.
Aileen Bertha Cole, Fremont, Ohio.
Mabel Eloise Doyle, Barbadoes, British West Indies.
Esther Ellen Edwards, Williamsport, Pa.
Lenora Jean Gillard, St. Paul, Minn.
Sarah Elaine Harris, Galveston, Tex.
Sophia Augusta Hill, Washington, D. C.
Pauline Elizabeth James, Newark, N. J.
Harriet Wheeler Jones, Philadelphia, Pa.
Gertrude Pollie Le Count, Providence, R. I.
Florence Anderson Moses, Salem, Mass.
Beatrice Edna Porter, Niagara Falls, N. Y.
Inez Logan Smith, Orange, N. J.
Rachael Maurice Taylor, Harrisburg, Pa.
Louise Clorie Walker, Galveston, Tex.
Clara Jeannette West, Richmond, Va.
Harlene White, Fayetteville, N. C.
Edith Estella Yancey, Washington, D. C.

Lectures.

The course of lectures was delivered by the following staff:

Gynecology	J. E. H. Taylor, M. D.
Anatomy and physiology	S. L. Carson, M. D.
Hygiene	C. A. Brooks, M. D.
Theoretical nursing	Laura R. MacHale.
Practical and theoretical nursing	Emma M. Irwin.
Diseases of the eye	M. O. Dumas, M. D.
Medical nursing	Caryl Burbank, M. D.
Diseases of children	William French, M. D.
Obstetrics	E. D. Williston, M. D.
Materia medica and therapeutics	John W. Mitchell, M. D.
Urinalysis and bacteriology	W. Van Swearingen, M. D.
Neurology	E. C. A. Wilson, M. D.
Ear, nose, and throat	M. O. Dumas, M. D.
Surgical nursing	William A. Jack, M. D.
Dietetics	

Applications, resignations, dismissals, etc.

Applications received during the year	155
Applicants taken on probation	28
Accepted after probation	16
Not accepted after probation	1
Resigned	5
Still on probation	11
Dismissed	1

Nursing staff.

Superintendent of nurses	1
Assistant superintendent of nurses	1
Graduate head nurses	3
Night supervisor of nurses	1
Graduate of class 1917 still in hospital	6
Senior pupil nurses	8
Intermediate pupil nurses	6
Junior pupil nurses	14
Probationers	12

Textbooks used.

Anatomy and Physiology—Kimber's.
Materia Medica—Foot's.
Theory and Practice of Nursing—Hampton.
Gynecology—McFarland.
Dietetics—Hall.
Bacteriology—Carey.
Fever Nursing—Paul.
Obstetrics—Cooke.
Care of Feeding of Children—Holt.
Ethics—Aikens.
First year nursing—Goodnow.

Nurses are required to furnish their own books.

Course of instruction.

First year:
- Ethics—Five lectures.
- Anatomy and physiology—Sixteen lectures, one hour each.
- Hygiene—Eight lectures, 1½ hours each.
- Bandaging—Two lectures, one hour each.
- Practical and theoretical nursing—Two lectures a week, 1½ hours each, from October 1 to May 1.

Second year:
- Materia medica—Seven lectures, one hour each.
- Bacteriology and urinalysis—Twelve lectures, one hour each.
- Medical nursing, including the acute infectious diseases—Eight lectures, one hour each.
- Surgical nursing, including anæsthetics—Eight lectures, one hour each.
- Dietetics—Ten lectures, one hour each.
- Practical and theoretical nursing—One lecture a week, one hour each, from October 1 to May 1.

Third year:
- Obstetrics—Eight lectures, one hour each.
- Children's diseases, including the feeding of infants—Nine lectures, one hour each.
- Diseases of the eye—Three lectures, one hour each.
- Diseases of the ear, nose, and throat—Four lectures, one hour each.
- Gynecology—Six lectures, one hour each.
- Nervous diseases—Eight lectures, one hour each.
- Practical and theoretical nursing—One lecture a week, one hour each, from October 1 to May 1.

First-year practical demonstrations.

[Each lesson one and one-half hours long.]

October:
- First lesson—Bedmaking; management of helpless patients—moving, changing, giving baths.
- Second lesson—Note taking; pulse, temperature, respiration, mental condition.
- Third lesson—The temperature; the thermometer, its use and care; excretions; eruptions.
- Fourth lesson—Pulse; quality, rhythm, number, etc.; hypodermic syringe, its care and use.

November:
- Fifth lesson—Fomentations; poultices; sand bags; ice cap, its care; ice coil.
- Sixth lesson—The hot-water bag or bottle, use and abuse; care of instruments, sterilizing, etc.; care of rubber gloves, methods of sterilizing.
- Seventh lesson—Administering of enemata, douches, cantharides, etc.; Murphy infusion.
- Eighth lesson—Counterirritations, mustard, cantharides, etc.; physiological action; dry cupping.
- Ninth lesson—Hypodermoclysis; intravenous or infusion; preparation of solution; patient, instruments.

December:
- Tenth lesson—Positions: Dorsal, Sims, Trendelenberg, Fowler's knee and chest; lithotomy.
- Eleventh lesson—Prevention and treatment of bedsores.
- Twelfth lesson—Weights and measures, solutions.
- Thirteenth lesson—Disinfection of clothing, excreta, sputum, etc.

January:
- Fourteenth lesson—Bandages, making and use; material, Esmark.
- Fifteenth lesson—Care of patient before, during, and after anesthesia.
- Sixteenth lesson—Care of patient before, during, and after operation, and preparation of patient for operation.
- Seventeenth lesson—Preparation of room for operation, sterilization, etc.

February:
- Eighteenth lesson—Urine analysis, specific gravity, quantity reaction, Fehling's and Heller's tests.
- Nineteenth lesson—Contagious-disease nursing, care of convalescents, feeding in particular.
- Twentieth lesson—Infant feeding, sterilization, pasteurizing, child's first bath, care of eyes, buttocks, etc.
- Twenty-first lesson—Administration of drugs, use and effect.

March:
- Twenty-second lesson—Care of the dead.
- Twenty-third lesson—Fumigation.

Course in cooking, theoretical and practical.

THEORY.	PRACTICAL WORK.
1. Water food	Coffee, tea, barley water, lemonade.
2. Carbohydrates—starch	Gruels, toast, Zwieback.
3. Carbohydrates—cellulose	Cereals and vegetables.
4. Carbohydrates—sugar	Fruits, sirups, jelly.
5. Fats and oils—salads	Salads, salad dressing, butter, cream.
6. Proteids—milk	Pasteurized, peptonized, koumiss.
7. Proteids—eggs	Cooked in shell, poached, omelets.
8. Proteids—milk and eggs	Custards, eggnogs, egg lemonade.
9. Proteids—meat and fish	Broiling, roasting, meat sandwiches.
10. Proteids—meat	Beef juice, beef extract, broth.
11. Proteids—gelatin	Chicken jelly, veal jelly, beef jelly.
12. Review carbohydrates	Sponge cake, ice cream, water ices.

Three-year schedule.

Ward.	Day duty.	Night duty.
SURGICAL EXPERIENCE.	*Months.*	*Months.*
Male	2	1
Female	2	1
Genito-urinary	1	1
Gynecological	4	2
Orthopedic	1	1
Emergency operating room	1	1
Main operating room	3	.....
Obstetrical	2	1
MEDICAL EXPERIENCE.		
Male	3	1
Female	3	1
Children	2	1
Diet kitchen	1	.....
Total	25	11

Occupation and residence of graduates.

1896.

Ashton, Luci V. (Mrs. Woods), Kansas City, Mo.
Blackburn, N. L., private nurse, Philadelphia, Pa.
Burke, Julia (Mrs. Phillips), Jacksonville, Fla.
Fleetwood, Sara I., deceased.
Foust, Isabella L., private nurse, Winston, N. C.
Gibson, Katherine C., Bureau of Engraving and Printing, Washington, D. C.
Green, Anna N., deceased.
Owens, Laura A., private nurse, Washington, D. C.
Pierce, Letitia (Mrs. Blair), Washington, D. C.
Ricks, Antoinette M. (Mrs. Demby), Kansas City, Mo.
Robinson, Annie B., superintendent and matron, Good Samaritan Hospital, Charlotte, N. C.
Shorter, Sarah A., private nurse, Washington, D. C.

1896—Continued.

Simms, Annie A. (Mrs. Johnson), Baltimore, Md.
Smith, Gertrude (Mrs. Thorn), Washington, D. C.
Tyler, Elizabeth, district nursing, New York City.

1897.

Caldwell, Amanda J. (Mrs. Darrell), Dallas, Tex.
Combs, Annie, massage specialist, Washington, D. C.
Green, Lucille (Mrs. Tibbs), St. Paul, Minn.
Griffin, G. Josephine, private nurse, Washington, D. C.
Haithcock, Ada, private nurse, Washington, D. C.
King, Annie C. (Mrs. Hughes), Richmond, Va.
Rollins, Willie M. (Mrs. Frazier), Washington, D. C.

Occupation and residence of graduates—Continued.

1897—Continued.

Smith, S. May, private nurse, Troy, N. Y.
Thomas, Annie M., private nurse, Washington, D. C.
Thompson, Della R. (Mrs. Davis), Vienna, Va.
Underhill, Katherine P. (Mrs. Wm. Moten), Washington, D. C.
Webb, Eva, private nurse, Washington, D. C.
Warner, Florence A., private nurse, Springfield, Mass.
Young, Lola E. M., private nurse, Greenville, S. C.

1898.

Bannister, Carrie J. (Mrs. Knox), Washington, D. C.
Bennett, Florence R., private nurse, Baltimore, Md.
Cabannis, Martha E., night supervisor, Freedmen's Hospital, Washington, D. C.
Carter, Edith M., private nurse, New Rochelle, N. Y.
Davis, Annie M., private nurse, Shelbyville, Tenn.
Ennis, Sarah J. (Mrs. Brooks), Washington, D. C.
Gaines, Mary R., private nurse, Berkeley, Cal.
Geder, Isabella, private nurse, Binghamton, N. Y.
Hurlong, Mary A., private nurse, Asheville, N. C.
King, Carrie M. (Mrs. Foreman), Washington, D. C.
Robinson, Amelia A., private nurse, Nashville, Tenn.
Russell, Ruby E., private nurse, Charlottesville, Va.
Stanton, Priscilla (Mrs. Todd), Pittsburgh, Pa.
Sumby, Lillie May, private nurse, Washington, D. C.
Valentine, J. Ella, private nurse, Lebanon, Ind.
Whitson, Clara E. (Mrs. Howe), Washington, D. C.

1899.

Banks, Effie P. (Mrs. Sykes), Indianapolis, Ind.
Brown, Agnes M., private nurse, Meyersdale, Pa.
Coleman, Georgia A., private nurse, Washington, D. C.
Dismond, S. Matthew (Mrs. Dibble), St. Louis, Mo.
Francis, Bertha A., head nurse, Home Hospital, Birmingham, Ala.
Hairston, Lulu C. (Mrs. Crews), Winston, N. C.

1899—Continued.

Hankins, Mintha C., private nurse, Washington, D. C.
Hendricks, Eliza R. (Mrs. Brown).
Henry, Lillian M., private nurse, Downingtown, Pa.
Hoge, Carrie M., private nurse, Washington, D. C.
Keemer, Jessie E. (Mrs. Robinson), Providence, R. I.
McEwen, Irene O. (Mrs. Green), Pensacola, Fla.
Rich, Anna, private nurse, Hartford, Conn.
Scott, Helen V. (Mrs. Cole), Swansboro, Ga.
Thompson, Isabella, private nurse, New Orleans, La.
Wilson, Emma C., private nurse, Montgomery, Ala.
Williams, Elmira E., deceased.

1900.

Clarke, Mary F., private nurse, Richmond, Va.
Hamilton, Priscilla, deceased.
Hawkins, Nannie E., private nurse, Charlotte, N. C.
Hunton, Mary A. (Mrs. Gordon), St. Louis, Mo.
Johnson, Hattie B. (Mrs. Cunningham), Owensboro, Ky.
Lewis, Eva P., private nurse, Manassas, Va.
Mickens, Marcella C., private nurse, Pittsburgh, Pa.
Middleton, Haga H., private nurse, Charleston, S. C.
Moody, Annie L., private nurse, Washington, D. C.
Smith, Cora V., private nurse, Camden, N. J.
Winfield, Laura, private nurse, Ware, Mass.

1901.

Allen, Margaret A., public health nurse, Jacksonville, Fla.
Barks, Susan C., visiting nurse, Jacksonville, Fla.
Campbell, B. N., private nurse, Montgomery, Ala.
Dey, Mary L., private nurse, Philadelphia, Pa.
Hackley, Mamie E. (Mrs. Ash), Philadelphia, Pa.
Hanson, Carrie L., private nurse, Baltimore, Md.
Harrell, Catherine S. (Mrs. Butler), Texas.
Hunter, Bessie, private nurse, Washington, D. C.
Jackson, Eliza A., private nurse, Richmond, Va.

Occupation and residence of graduates—Continued.

1901—Continued.

Jones, Mary J., private nurse, Washington, D. C.
Powell, Gussie D., private nurse, Richmond, Va.
Rhone, Charlotte S., private nurse, Newbern, N. C.
Robinson, Frances A., private nurse, Newbern, N. C.
Thomas, Bertha J., head nurse, Freedmen's Hospital, Washington, D. C.
Walcott, Louisa M., private nurse, Rockhill, S. C.
Whitley, Florence A., private nurse, Newbern, N. C.

1902.

Adams, Ella C., private nurse, Philadelphia, Pa.
Baker, Vera L., head nurse, State Hospital, Goldsboro, N. C.
Booth, Mary S., private nurse, Washington, D. C.
Delisse, Augusta V., private nurse, Brooklyn, N. Y.
Dias, Frances C., private nurse, Philadelphia, Pa.
Johnson, Gertrude B., private nurse, Niagara Falls, N. Y.
Mason, Corinna (Mrs. Phillips), Springfield, Mass.
Nichols, Florence L. (Mrs. Avant), Charlotte, N. C.
Rogers, Amanda, private nurse, Indianapolis, Ind.
Roper, Maggie A., private nurse, Galveston, Tex.
Thompson, Rachel A. (Mrs. Thomas), deceased

1903.

Balentine, J. L. (Mrs. Dial), Jacksonville, Fla.
Browne, E. M., head nurse, Douglass Hospital, Philadelphia, Pa.
Baltimore, Mary E., private nurse, Harrisburg, Pa.
Christie, Sarah E., (Mrs. Selah), Chester, Pa.
Coates, Maiella E., private nurse, Washington, D. C.
Hargrave, L. S., private nurse, Trenton, N. J.
Johnson, L. D., private nurse, Warrenton, N. C.
Johnson, Nellie V., private nurse, Abbeville, S. C.
Latney, Carrie L. (Mrs. Bowie), Washington, D. C.
Love, Ellen V., private nurse, Lumberton, N. C.
Purcell, E. J., private nurse, Brunswick, Ga.

1903—Continued.

Rollins, Clara A., private nurse, Washington, D. C.
Rutherford, Anna L., private nurse, Kingston, N. C.
Sharp, Carrie M. (Mrs. Morgan), Petersburg, Va.
Yarborough, S. V. S. (Mrs. Allen), Columbus, Ga.

1904.

Baker, Hattie E., private nurse, Darlington, S. C.
Blackwell, W. Lucille (Mrs. Morris), New York, N. Y.
Carter, Mary E., private nurse, Rippon, W. Va.
Carter, Elizabeth V., head nurse, Mercy Hospital, Philadelphia, Pa.
Grant, Anna E. (Mrs. Millen), Savannah, Ga.
Gilmore, Mary E., private nurse, Leavenworth, Kans.
James, Aleathia D. (Mrs. Franklin), Jacksonville, Fla.
Jeffries, Emma M., private nurse, Redbank, N. J.
Jones, Violet, private nurse, Hartford, Conn.
Lewis, Louzetta (Mrs. Mitchell), Montgomery, Ala.
Richardson, Effie V. (Mrs. McCoy), Washington, D. C.
Thomas, Marie E. (Mrs. Jones), Topeka, Kans.

1905.

Braxton, Margaret, private nurse, Hartford, Conn.
Brooks, Alpha E. (Mrs. Jones), Fairmont Heights, D. C.
Carter, Marion M., private nurse, Washington, D. C.
Henderson, Hattie E., private nurse, Cleveland, Ohio.
Holmes, Julia E., private nurse, Plainfield, N. J.
Jefferson, Roxanna M., private nurse, Bristol, Tenn.
Kidd, Bertha M. (Mrs. Harris), Washington, D. C.
Long, Ida E., private nurse, Newark, N. J.
Maston, Mary J., head nurse, Red Cross Sanitarium, Louisville, Ky.
Scott, Julia E., private nurse, New Haven, Conn.
Teabout, Stella, private nurse, Richfield Springs, N. Y.
Taliaferro, Olivia, private nurse, Anacostia, D. C.
Terry, Jessie C., private nurse, Los Angeles, Cal.

Occupation and residence of graduates—Continued.

1905—Continued.

Williams, Daisy M. (Mrs. Moten), Sherman, Tex.
Williams, Mary T., private nurse, Ware Neck, Va.
Wilson, Annabel, private nurse, Baltimore, Md.

1906.

Barnes, Annie, private nurse, Baltimore, Md.
Bearce, Daisy M., private nurse, Rye, N. Y.
Burress, Mary E. (Mrs. Wormley), Ardwick, S. C.
Gordon, Mary B., private nurse, Washington, D. C.
Hall, Iona M., private nurse, Troy, Ohio.
Henderson, Sara O., private nurse, Newport, R. I.
Johnson, Harriett C., private nurse, Cleveland, Ohio.
Lewis, Willie A., private nurse, Atlanta, Ga.
Lucas, Marion V. (Mrs. Monroe), Washington, D. C.
McDougal, Colota M., district nurse, Indianapolis, Ind.
McKnight, Viola, superintendent of nurses, Mercy Hospital, Philadelphia, Pa.
Marshall, Mary E., private nurse, Morristown, Tenn.
Merritt, Mary E., superintendent of nurses, Mitchell Hospital, Leavenworth, Kans.

1907.

Bulock, Blanche V., private nurse, Richmond, Va.
Childs, Helen D., private nurse, Philadelphia, Pa.
Escoffery, Lula M., private nurse, Atlantic City, N. J.
Harmon, Nannie M., private nurse, Tip Top, Va.
Porter, Susan H., dean woman's department, Tuskegee, Ala.
Payton, Lillian M., private nurse, Washington, D. C.
Peck, Alice M. (Mrs. Anderson), Boston, Mass.
Rose, Julia M., private nurse, Lynchburg, Va.
Slocum, Mary E., private nurse, Providence, R. I.
Smith, Minnie M., private nurse, Amherst, Mass.
Taylor, Loretta P. (Mrs. Banks), Washington, D. C.
Wright, Nena J. (Mrs. Jackson), New York City.

1908.

Briggs, Cornelia K., private nurse, Troy, N. Y.
Denning, Clara S. (Mrs. Robinson), Baltimore, Md.
Douglas, Kate E. (Mrs. Barter), Newark, N. J.
Donaldson, Vesta I., private nurse, Ocean Grove, N. J.
Fray, Julia (Mrs. Clark), Chicago, Ill.
Henderson, Jamima S., private nurse, Spring Lake, N. J.
Jones, Bertie L., private nurse, Harrisburg, Pa.
Nicholas, Beatrice E., private nurse, Baltimore, Md.
Proctor, Eva M., private nurse, Newark, N. J.
Robinson, Alice E., private nurse, Hartsville, S. C.
Reynolds, Agnes, private nurse, Ironton, Ohio.

1909.

Allen, Irene P. (Mrs. Martin), deceased.
Burnett, Sarah L., private nurse, Washington, D. C.
Coates, Nana E., Battle Creek, Mich.
Curtis, Minnie M., private nurse, Marietta, Ohio.
Green, Lillian C. (Mrs. Davis), Washington, D. C.
Hall, Anita B., private nurse, Baltimore, Md.
Hankle, Areatha B. (Mrs. Bailey), St. Louis, Mo.
Johnson, Lillian A., private nurse, Poughkeepsie, N. Y.
Lewis, Charlotte M., private nurse, Atlanta, Ga.
Parker, Mary E., private nurse, Williamsport, Pa.
Sheppard, Emma D., private nurse, Meyersdale, Pa.
Smith, Annie M., private nurse, Jacksonville, Fla.
Spears, Lillian, private nurse, Providence, R. I.
Wainwright, Melinda E., Charles Town, W. Va.

1910.

Amby, Grace, married, Baltimore, Md.
Brown, Nellie V., private nurse, Meyersdale, Pa.
Howard, Mrs. Sankey B., Goldsboro, N.C.
Gates, Eugene J. P., private nurse, Washington, D. C.
Gilliam, Octavia T., private nurse, Hanover, Va.
Hutchinson, Mabel M., private nurse, Lockport, N. Y.

Occupation and residence of graduates—Continued.

1910—Continued.

Jackson, Sara E., private nurse, Steelton, Pa.
Jordan, Maggie M., private nurse, Washington, D. C.
McClaine, Nettie L. (Mrs. George), Paducah, Ky.
Richardson, Lizzette S., private nurse, Washington, D. C.
Reid, Marion M., private nurse, Denver, Colo.

1911.

Blackburn, Clara E. (Mrs. Miller), Wheeling, W. Va.
Clay, Eva Virginia, Central State Hospital, Petersburg, Va.
Coates, Edna May (Mrs. Gloster), Wheeling, W. Va.
Green, Emily Estella (Mrs. Allen), Washington, D. C.
Grisby, Sara Elizabeth, private nurse, Washington, D. C.
Harris, Florence M., private nurse, Brooklyn, N. Y.
Hopkins, Jennie C., private nurse, New York City.
Patton, Jesse Boyd, superintendent of nurses, Mercy Hospital, Nashville, Tenn.
Piper, Ida J. (Mrs. Robinson), Boston, Mass.
Price, Mae Irene, private nurse, Baltimore, Md.
Stevens, Nettie Bentley, private nurse, Atlanta, Ga.
Thompson, Lulu E., private nurse, Washington, D. C.
York, Martella M., head nurse, Freedmen's Hospital, Washington, D. C.

1912.

Abner, Carrie (Mrs. Bumbry), Chicago, Ill.
Butler, Marguerite C., private nurse, Boston, Mass.
Carter, Elizabeth F. A., private nurse, Washington, D. C.
Christian, Estelle A., private nurse, Richmond, Va.
Eaton, Sadie E., private nurse, Raleigh, N. C.
Simmons, Mary A. (Mrs. Moore), Magnolia, N. J.

1913.

Anderson, Maude H., private nurse, Philadelphia, Pa.
Barnes, Mayme, Central State Hospital, Petersburg, Va.
Berkley, Pearl B., private nurse, Washington, D. C.
Davis, Alice E., private nurse, Frederick, Md.

1913—Continued.

Elliott, Frances R., private nurse, Washington, D. C.
Garrott, Roberta Lee, private nurse, Washington, D. C.
Green, Cecilia M., head nurse, Freedmen's Hospital, Washington, D. C.
Henry, Eva G., private nurse, Washington, D. C.
Howland, Elizabeth B., private nurse Brooklyn, N. Y.
Jackson, Edna V. (Mrs. Brooke), Kansas City, Mo.
Jordan, Emily M., private nurse, Washington, D. C.
Kemper, Etta C., Barnett Hospital, Huntington, W. Va.
Lawson, Bessie M., private nurse, Pittsburgh, Pa.
Meredith, Angie E. (deceased).
Ockrey, Minnie, Edward's Hospital, Bluefield, W. Va.
Russell, Josephine M., private nurse, Washington, D. C.
Wingate, Elizabeth E., private nurse, Charleston, S. C.

1914.

Byrd, Carrie Lena, private nurse, Wilmington, Del.
Cargyle, Laura Aurelia, private nurse, Atlanta, Ga.
Clark, Ophelia Elizabeth, private nurse, Indianapolis, Ind.
Jackson, Alice Veronica, private nurse, Washington, D. C.
Jordan, Blanche Lillian, private nurse, Washington, D. C.
Minor, Ethel Mae, private nurse, Blue Plains, D. C.,
Mundin, Maude E., private nurse, Richmond, Va.
Robinson, Adaline, private nurse, Kansas City, Mo.
Shelton, Willie Belle, private nurse, Buffalo, N. Y.
Smith, Lena Mae, private nurse, Washington, D. C.
Thompson, Edna Sylvia, private nurse, New York City.
Varner, Amanda Evalina, private nurse, Atlanta, Ga.
Walker, Olive Glennie, public health service, Cleveland, Ohio.
Williamson, Lulu Howard (Mrs. Kingslow), Bluefield, W. Va.

1915.

Benson, Katherine Zada, private nurse, Washington, D. C.
Brown, Marion Hilda, private nurse, Bluefield, W. Va.
Johnson, Helen Clotilda, private nurse, Wilkes-Barre, Pa.

Occupation and residence of graduates—Continued.

1915—Continued.

Lovett, Caroline Beatrice (Mrs. Terry), Williamsport, Pa.
Martin, Alice Ellen, private nurse, Birmingham, Ala.
Owen, Christie Elaine, head nurse, Freedmen's Hospital, Washington, D. C.
Sheppherd, Mary J., private nurse, Meyersdale, Pa.
Spurlock, Pearl Mabel, private nurse, Pittsburgh, Pa.

1916.

Clifford, Helen Healy, private nurse, Martinsburg, W. Va.
Gill, Edith Berncenia, private nurse, Pittston, Pa.
Graham, Carrie Francis, private nurse, Boston, Mass.
Hammie, Lola Montice, private nurse, Washington, D. C.

1916—Continued.

Holmes, Cora Lee, private nurse, Norfolk, Va.
Lightfoot, Josephine Julia, private nurse, Berryville, Va.
May, Charlotte King, private nurse, Holton, Kans.
Marsh, Louise Veronica, private nurse, Norfolk, Va.
Minnis, Nancy Jeanette, private nurse, Norfolk, Va.
Scott, Irene Rhodelia, private nurse, Atlanta, Ga.
Smith, Georgia Penn (Mrs. Reed), Washington, D. C.
Walker, Fannie Geneva, private nurse, Lockland, Ohio.
Weeks, Mary Viola, private nurse, Norfolk, Va.
Yeatman, Lucille Bernice, private nurse, Philadelphia, Pa.

Very respectfully,

W. A. WARFIELD,
Surgeon in Chief.

The SECRETARY OF THE INTERIOR.

REPORT OF THE PRESIDENT OF HOWARD UNIVERSITY.

ROSTER OF OFFICERS.

BOARD OF TRUSTEES FOR 1916–1917.

Ex-Chief Justice Stanton Judkins Peelle, LL. D., *president.*
Stephen Morrell Newman, A. M., D. D., *president of university.*
George William Cook, LL. M., *secretary and business manager.*
Edward Lamay Parks, D. D., *treasurer and registrar.*

Term Expires 1917.

Mr. John Thompson Emlen, Philadelphia, Pa.
Thomas Jesse Jones, Ph. D., Washington, D. C.
Rev. Jesse Edward Moorland, D. D., Washington, D. C.
Hon. James Carroll Napier, LL. D., Nashville, Tenn.
Charles Burleigh Purvis, M. D., Boston, Mass.
James Henry Nelson Waring, A. B., M. D., Washington, D. C.
Marcus Fitzherbert Wheatland, M. D., Newport, R. I.

Term Expires 1918.

Justice George Wesley Atkinson, LL. D., Washington, D. C.
Rev. Harland Paul Douglass, D. D., New York City.
Andrew Franklin Hilyer, A. B., LL. M., Washington, D. C.
Rev. Stephen Morrell Newman, D. D., Washington, D. C.
Ex-Chief Justice Stanton Judkins Peelle, LL. D., Washington, D. C.
Rev. Ulysses Grant Baker Pierce, D. D., Washington, D. C.
Rev. Charles Herbert Richards, D. D., New York City.

Term Expires 1919.

Justice Job Barnard, LL. D., Washington, D. C.
William Van Zandt Cox, A. M., Washington, D. C.
Rev. Francis James Grimke, D. D., Washington, D. C.
Mr. Cuno Hugo Rudolph, Washington, D. C.
William Albert Sinclair, M. D., Philadelphia, Pa.

HONORARY BOARD.

Hon. Joseph Hodges Choate,* LL. D., New York City.
Mr. John Adams Cole, Chicago, Ill.
Bishop Benjamin Franklin Lee, D. D., Wilberforce, Ohio.
Hon. Joseph Draper Sayers, Austin, Tex.
Hon. William Howard Taft, LL. D., New Haven, Conn.
Bishop Benjamin Tucker Tanner, LL. D., Philadelphia, Pa.
Bishop Wilbur Patterson Thirkield, LL. D., New Orleans, La.
Hon. George Henry White, Philadelphia, Pa.

PATRON EX OFFICIO.

Hon. Franklin Knight Lane, Secretary of the Interior.

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*Deceased.

REPORT OF THE PRESIDENT OF HOWARD UNIVERSITY.

HOWARD UNIVERSITY,
Washington, D. C., July 1, 1917.

SIR: I have the honor to submit for Howard University the following report, showing the condition of the institution on the 1st day of July, 1917, "embracing therein the number of pupils received and discharged or leaving the same for any cause during the year and the number remaining; also the branches of knowledge and industry taught and the progress made therein, together with a statement showing the receipts of the institution, and from what sources, and its disbursements and for what objects."

REGISTRATION.

The opening of the session of 1916–17 brought to us a larger number of students than ever before. From the first day the enrollment showed an increase which was maintained throughout the year. The chief increases were in the academy and the school of medicine. In the latter the dental courses outstrip the medical and pharmaceutic courses in their gain. The total for the year has been 1,476, not including 89 who took work by correspondence in the school of theology. The final total is 1,565, an increase of 57 over the year 1915–16. The students come from 38 different States and 10 foreign countries.

Students during year ended June 30, 1916.

College of arts and sciences	370	
Teachers' college	149	
School of manual arts and applied sciences	40	
Conservatory of music	114	
School of theology	57	
School of medicine	320	
School of law	86	
Academy	326	
Commercial college	91	
Total		1,553
Names duplicated because of students taking special courses in different departments		77
Net total		1,476
Correspondence students not counted above		89
Final total		1,565

The total number graduated was 242, distributed as follows:

Graduates in 1917.

College of arts and sciences	42
Teachers' college	21
Normal course	10
Kindergarten	3
Domestic science	2
School of theology	15
Medical college	13
Dental college	36
Pharmaceutic college	14
School of law	26
Conservatory of music	2
School of manual arts and applied sciences	1
Academy	38
Commercial college	19
Total	242

We have added no new departments to the 10 well-established ones under 10 different faculties, which we have had for some years. The number is sufficient for our work as at present constituted.

Of our 10 departments, 3 are professional schools—viz, theology, medicine, law.

THE SCHOOL OF THEOLOGY.

The school of theology is entirely supported by private funds, partly the revenue from specific endowments and partly donations from individuals and general gifts with a small amount from the fees of students. No expense whatever is paid out of the congressional appropriation to Howard University. The department is recognized as having done a great work for the colored ministry of all denominations. One teacher has been added to the faculty during the past year. The effort to fit the courses of study to the needs of the present is constantly carried on, and the results are seen in a better fitness for work on the part of our students. The work by correspondence is growing and is proving very helpful to scores of ministers who can not leave their parishes.

The roll of students for the year was as follows:

Students in school of theology.

Seniors	14	
Middlers	8	
Juniors	9	
Unclassified	10	
		41
Correspondence students matriculated as university students		16
Total		57
Correspondence students not matriculated as university students		89
		146

Of these, 12 received degrees and 3 received diplomas.

THE SCHOOL OF MEDICINE.

The work of this school is divided into three colleges, viz, medical, dental, and pharmaceutical. The medical work has unexcelled opportunities in its close connection with the Freedmen's Hospital, where all clinics are held and all of whose wards are open to our students for examination, diagnosis, and study. The building is of the latest type in all respects and has several thousand patients go through it annually. Many other thousands come to it for dispensary and clinical treatment. No students in the country have better facilities for becoming acquainted with disease.

The dental college and laboratories have been refitted the last few years with the latest and best chairs and appliances. The increase of dental students exceeds that of any other branch of the university. Our men are notably progressive and successful wherever they locate.

The pharmaceutical college is greatly strengthened by improvements in laboratories and supplies. The buildings of the three colleges are being put into the best possible shape. The teachers are devoted and skillful. No finer work is done anywhere on the same amount of money than that done by our school of medicine.

The roll of students for the year was as follows:

Students in medical school.

Seniors	19
Juniors	32
Sophomores	26
Freshmen	34
Senior dental	39
Second year dental	57
First year dental	67
Senior pharmaceutic	16
Second year pharmaceutic	17
First year pharmaceutic	13
	320

Of these, 63 received degrees—13 in medicine, 36 in dentistry, 14 in pharmacy.

THE SCHOOL OF LAW.

At the first of this session one of the finest teachers of this school died, a lawyer of very high standing in the city, who had been connected with the school since its foundation. Other lawyers of high standing have been placed upon the faculty and readjustments of courses have been made to suit their specialties. The staff of teachers is a strong one.

Whenever funds can be had for the purpose the building must be enlarged, because the classes are not properly accommodated. We should have at least two more lecture rooms.

The roll of students for the year was as follows:

Students in law school.

Seniors	25
Middlers	29
Juniors	32
Total	86

COLLEGIATE SCHOOLS.

Below our three professional schools we have five collegiate schools.

THE COLLEGE OF ARTS AND SCIENCES.

The registration of this department increased this year by 35 students over the previous year and is the largest the department has ever had. In addition, 42 students of other departments were assigned to one or more classes. The number devoting themselves to different branches of science is larger than that in any other kind of studies. The group of modern languages stands next in rank so far as numbers are concerned.

On the whole, professional students are seeking a wider and better general training before specializing. In many cases haste in entering upon professions is being corrected and better results are being secured.

The roll of students for the year was as follows:

Students in college of arts and sciences.

Seniors	39	
Juniors	47	
Sophomores	95	
Freshmen	161	
Specials	26	
Total number registered in college of arts and sciences		368
Specials registered in other departments		42
		410

Of these, 42 received degrees.

THE TEACHERS' COLLEGE.

This department is gaining every year in strength, clearness of aim, and in a sense of what it is to fit young people for the work of teaching. This creates a tendency to lift the school to a professional basis. It is gratifying that many of our best students are looking forward to teaching as a profession for life instead of making it a makeshift for self-support for a few years while preparing for other callings. Every year finds some of our graduates going away to larger and older institutions for postgraduate study. We find that they stand well wherever they go.

The roll of students, who come from 25 different States, is as follows:

Students in teachers' college.

Seniors	16
Juniors	30
Sophomores	47
Freshmen	43
Part course	13
Total	149

Of these 36 received degrees and diplomas.

THE SCHOOL OF MANUAL ARTS AND APPLIED SCIENCES.

The new four-year course in home economics has been thoroughly outlined and is being sought for by a large number of students. Equipment of the best sort is being constantly added to all branches of the work in this department, and we now have in some things as good an outfit as can be found anywhere. Many years are necessary for securing the most expensive forms of equipment, but by careful planning on the part of our teachers much may be done with limited means.

The roll of students for the year was as follows:

Students in the school of manual arts and applied sciences.

Seniors	2
Sophomores	3
Freshmen	35
Part course	18
Academy	76
Total	134

THE CONSERVATORY OF MUSIC.

Even with the new quarters gained by moving into King Hall the conservatory has been obliged to turn away nearly a score of students. We have added another highly trained teacher for the coming year and hope to be able to care for all who come. We are also converting a dwelling house belonging to the university into additional studio and practice rooms. We are gaining some fine students in ability and our teachers are maintaining the highest standards.

The roll of students for the year was as follows:

Students in the conservatory of music.

Vocal	22	
Piano	93	
Violin	16	
Organ	8	
Harmony	16	
History	2	
		157
Names duplicated		43
Total		114

Of these, two received degrees.

THE LIBRARY SCHOOL.

During the past year we placed in charge of our library a highly trained librarian, who has had an adequate experience as a teacher in a library school elsewhere. He has begun to lay the foundation for an adequate library training by giving the last year a series of lectures to such students as could attend upon the handling and use of reference books. This is a matter in which most college students are deficient. There is need of a larger staff before full courses can be carried on.

SECONDARY SCHOOLS.

Below our collegiate schools we have two secondary schools.

THE ACADEMY.

The maintenance of our academy as a fitting school for students of our colleges is made necessary by the fact that many of our ambitious young people live in sections of the country in which they can not easily reach good high schools. Then, too, in many thinly populated sections, as well as in many small towns and even in some cities, the high schools do not have thorough and complete courses of study. They are, however, improving from year to year. The work of our academy is uniformly of a very high order. The studies are those of a well-regulated, modern high school.

Thirty students were graduated in May, 1916. Their distribution has been as follows:

Students in the academy.

Seniors	73
Middlers	71
Submiddlers	75
Juniors	67
Unclassified	40
Total	326

The roll of students for the year was as follows:

College of Arts and Sciences, Howard University	16
Teachers College, Howard University	1
Dental College, Howard University	3
Pharmaceutical College, Howard University	1
Cheney Institute, Cheney, Pa	1
New York City College, N. Y	1
Not in school	7
Total	30

THE COMMERCIAL COLLEGE.

No marked change has taken place in the number of students in this department. The instruction given by its teachers of shorthand and typewriting is always sought for by many students of other departments. The studies pursued embrace some general courses which are necessary for any intelligent and successful business person, as well as the technical studies necessary in fitting one for office work. Our students prove very helpful wherever placed.

The roll of students for the year is as follows:

Students of the commercial college.

Fourth year	21
Third year	21
Second year	15
First year	14
Special	19
Total	90

GENERAL STATEMENT.

The great outstanding experience of Howard University in the school year just closed is the effect which was produced upon the student body by the entrance of the United States into the war against Germany. The months of the fall and winter were more alive with the problems brought forward by the war, but when war

was declared by our Nation, it became evident that the great majority of our students would pass through experiences which would be totally unknown in normal times.

We have not encouraged any undue excitement, but have clearly stated to the students that the proper handling of the great thoughts springing from world conditions was an education in itself not to be found in textbooks. It became evident that deep patriotic feeling abounded within our ranks, and as the second semester passed by, this feeling took shape in a proffer of services to the Government and later on in the enrollment of many instructors and students for the training camp at Des Moines, Iowa. It is gratifying to know that when examinations took place under army officers far fewer rejections were necessary in our student body than in a corresponding number from general life. This speaks loudly for the success of the methods pursued by the university for the physical welfare of its members.

Our work has been very much cramped the past year by lack of class rooms for our enlarged student body and by the lack of means to establish some very necessary courses, if we are to send out our students fully furnished for the work of life. We need buildings, money for endowment, and for current expenses.

During the year the University celebrated the fiftieth anniversary of its foundation by appropriate exercises. The occasion brought out historical reminiscences and deepened the sense of the part which the institution is taking in the life of the Nation and the world.

REPORT OF TREASURER.

The financial statement for the year 1916–17 is appended. We have retained during the year the same helpers in our accounting room, and the auditing of all our accounts has been done under first-class inspection. The expenditure of all money appropriated for our use by Congress takes place under the rigid supervision of the Department of the Interior.

STEPHEN M. NEWMAN,
President.

The SECRETARY OF THE INTERIOR.

FINANCIAL REPORT.

Expenditure of appropriation for maintenance, fiscal year ended June 30, 1917.

Administration:		
President, in part	$3,200.00	
Secretary, dean of commercial college, and professor, in part	1,800.00	
Treasurer, registrar, and professor of economics and political science, in part	1,800.00	
		$6,800.00
College of arts and sciences:		
Dean and professor of mathematics, in part	1,508.00	
1 professor of biology, in part	1,415.00	
1 professor of history, in part	1,415.00	
1 professor of English, in part	1,415.00	
1 professor of Latin, in part	1,415.00	
1 professor of physics, in part	1,410.00	
1 professor of chemistry, in part	985.00	
1 professor of Greek, in part	430.00	
1 professor of zoology, in part	1,070.00	
1 assistant professor of public speaking, in part	945.00	

College of arts and sciences—Continued.		
1 instructor in French, in part	$1,174.50	
1 associate professor of mathematics, in part	1,195.00	
1 assistant professor of German, in part	755.00	
1 assistant professor of chemistry, in part	900.00	
1 instructor in English, in part	690.00	
1 instructor in botany, in part	600.00	
1 instructor in chemistry, in part	853.00	
1 instructor in German, in part	600.00	
1 instructor in physics, in part	515.00	
		$19,290.50
Teachers' college:		
Dean and professor of pedagogy, in part	1,508.00	
1 associate professor of mathematics, in part	1,365.00	
1 professor of psychology, in part	1,240.00	
1 assistant professor of practice teaching, in part	1,195.00	
1 professor of nature study, in part	645.00	
1 associate professor of history, in part	920.00	
1 instructor in speaking French, in part	480.00	
1 instructor in teaching history, in part	755.00	
		8,108.00
Academy:		
1 dean and professor of mathematics, in part	1,508.00	
1 professor of Greek and Latin, in part	1,280.00	
1 associate professor of Greek and Latin, in part	945.00	
1 instructor in English, in part	940.00	
1 instructor in chemistry and physics, in part	515.00	
1 instructor in English, in part	645.00	
1 instructor in Latin, in part	600.00	
1 instructor in German, French, and Spanish, in part	560.00	
1 instructor in mathematics, in part	515.00	
		7,508.00
Commercial college:		
1 instructor in bookkeeping, in part	860.00	
1 instructor in typewriting, etc., in part	945.00	
1 instructor in shorthand, in part	725.00	
1 instructor in English, in part	600.00	
1 instructor in bookkeeping, in part	631.00	
1 instructor in mathematics, in part	645.00	
		4,406.00
Conservatory of music:		
1 director and professor of singing, in part	1,240.00	
1 professor of piano and organ, in part	1,115.00	
1 instructor of piano, in part	730.00	
		3,085.00
Library:		
1 librarian, in part	1,508.00	
1 assistant librarian, in part	640.00	
1 cataloguer, in part	555.00	
1 assistant librarian, in part	430.00	
		3,133.00
Bookkeeper, in part	1,060.00	
1 assistant to the secretary, in part	836.76	
1 stenographer, in part	740.00	
1 cashier, in part	650.00	
1 secretary to the president, in part	645.00	
1 clerk, in part	635.00	
1 assistant to the registrar, in part	635.00	
1 preceptress, in part	600.00	
1 telephone operator, in part	635.00	
1 assistant preceptress, in part	175.00	
		6,611.76
School of law:		
1 dean and professor, in part	1,006.25	
1 lecturer on criminal law, in part	1,312.50	
1 lecturer on personal property and librarian, in part	1,312.50	
1 lecturer on partnership, in part	787.50	

School of law—Continued.		
1 lecturer on real estate, in part	$787.50	
1 lecturer on equity, etc., in part	525.00	
1 lecturer on law of contracts, in part	300.00	
		$6,031.25
Total salaries		64,973.51
Stationery		26.49
Total		65,000.00

Expenditure of appropriation for manual arts and applied sciences.

1 director and professor in mechanical engineering	$1,650.00	
1 instructor in electrical engineering	1,050.00	
1 instructor in printing	812.00	
1 instructor in household arts	900.00	
1 instructor in household economics	1,050.00	
1 professor in applied biology, in part	800.00	
1 assistant in household arts	400.00	
1 instructor in physics, in part	200.00	
1 clerk	400.00	
1 assistant (student) in woodwork	50.00	
3 janitors	382.48	
		$7,694.48
Supplies and record		2,336.10
Equipment		1,969.42
Total		12,000.00

Expenditure of appropriation for natural-history studies and laboratories.

Chemical laboratory	$500.00
Physics laboratory	500.00
Biological laboratory	500.00
Academy physics and chemical laboratory	300.00
Nature-study laboratory	200.00
Total	2,000.00

Expenditure of appropriation for repairs of buildings and improvement of grounds.

Repairs to buildings	$8,726.84
Improvement of grounds	1,272.33
Total	9,999.17

Expenditure of appropriation for libraries.

Academic and medical library books, etc	$1,228.02
Law-library books, etc	254.50
Total	1,482.52

Expenditure of appropriation for fuel and light.

Fuel and labor, central heating plant	$2,924.20
Other fuel and gas	500.00
Total	3,424.20

Expenditure of appropriation for school of medicine.

Equipment and apparatus	$1,911.67
Laboratory supplies	1,798.22
Repairs to laboratories and buildings	3,245.02
Total	6,954.91

Distribution of expenditures from Government appropriations.

Appropriations.	Amount.	Expenditures.	
		Current fund.	Permanent-plant fund.
Disbursed through chief disbursing clerk of the Interior Department:			
Maintenance, salaries, etc	$65,000.00		
Salaries		$64,973.51	
Stationery		26.49	
Department of manual arts	12,000.00	10,030.58	$1,969.42
Libraries, equipment, books, etc	1,482.52	236.85	1,245.67
Improvement of grounds and repairs of buildings	9,999.17	9,999.17	
School of medicine, repairs to laboratories, laboratory supplies, and equipment	6,954.91	5,043.24	1,911.67
Laboratories, material, and apparatus	1,999.20	1,038.89	960.31
Fuel and light	3,424.20	3,424.20	
Total credited permanent-fund account			6,087.07
Total credited current fund		94,772.93	
Total appropriations	100,860.00	94,772.93	6,087.07

Balance sheet, June 30, 1917.

ASSETS.

Current assets:			
Cash on hand and in bank		$5,086.20	
Students' debit balances	$16,763.42		
Less reserve	5,869.86		
		10,893.56	
Accounts receivable		2,973.68	
Stock of supplies on hand		2,614.20	
Unexpired insurance		432.09	
Sundry investments		809.30	
Total current assets			$22,809.03
Educational plant:			
Land at June 30, 1916	$615,900.22		
Additions—sidewalk	157.25		
		616,057.47	
Buildings at June 30, 1916		559,009.77	
Equipment at June 30, 1916	$146,159.15		
Additions during the year	8,965.94		
		155,125.09	
Total educational plant			1,330,192.33
Endowment investments:			
Productive real estate, mortgages, and other securities			309,413.71
Unproductive land			96,779.90
Total assets			1,759,194.97

LIABILITIES AND FUNDS.

Current liabilities:			
Notes payable		$4,500.00	
Accounts payable		297.03	
Students' credit balances		1,319.99	
			6,117.02
General capital funds:			
Unexpended balances of special funds		2,828.09	
Current surplus—			
The general surplus	$4,596.60		
The medical-school surplus	9,267.32		
		13,863.92	
Plant capital		1,330,192.33	
Total general capital funds			1,346,884.34

Endowment funds:		
Permanent endowment funds		$309,413.71
Land fund (unrestricted):		
Balance at June 30, 1916	$96,937.15	
Appropriated toward improvement of plant	157.25	
		96,779.90
Total liabilities and funds		1,759,194.97

Income and expenditure account—Year ended June 30, 1917.

EXPENDITURE.

Instruction:		
College of arts and sciences	$57,813.22	
College laboratories	2,614.82	
School of theology	7,703.48	
School of law	9,559.83	
School of medicine	39,910.15	
Conservatory of music	4,999.18	
School of manual arts and applied sciences	10,483.51	
Library	5,438.93	
Gymnasium	1,274.45	
Young Men's Christian Association	1,228.52	
		$141,026.09
Maintenance		13,780.18
Administration		17,146.44
Student aid		2,150.01
Miscellaneous		2,708.98
Total current expenditure		176,811.70
Improvements and additions to plant		9,123.19
Total expenditure for strictly educational purposes		185,934.89
Additional for dormitories		7,990.21
Additional for dining hall		20,319.35
Athletics		5,758.90
Total expenditure for all purposes		220,003.35
Surplus of income for the year:		
The medical school—surplus	$1,423.95	
The general funds—deficit	167.12	
	$1,256.83	
Special funds—unexpended balances	66.89	
		1,323.72
		221,327.07

INCOME.

From students:		
Fees		66,183.12
From endowment:		
Rents and interest	$13,179.87	
Appropriated from land fund	157.25	
		13,312.12
From public funds:		
Federal Government appropriation		100,860.00
From donations:		
Various donors		2,733.75
From other sources		4,169.62
Total income for strictly educational purposes		187,258.61
Additional from dormitories		7,990.21
Additional from dining hall		20,319.35
Athletics		5,758.90
Total income for all purposes		221,327.07

Endowment funds, with income.

Name of funds for designated purposes.	Principal.	Income.
School of medicine	$15,000.00	$750.00
Hartford reading room	425.00	21.25
Henry G. Maynard prize debate	500.00	25.00
Intercollegiate debating fund	88.50	4.43
Gregory prize debate	100.00	5.00
General endowment fund	161,007.42	5,516.65
Stone professorship of theology	40,000.00	1,925.74
Emily H. Moir theological professorship	22,700.00	1,135.00
Ewell theological professorship	1,000.00	48.15
School of theology, alumni professorship	721.00	36.05
Thaddeus Stevens professorship	2,200.00	110.00
Grebel professorship	2,450.00	122.50
Whittier professorship	875.00	43.75
Alumni professorship	25.00	1.25
Wm W. Patton memorial professorship	12.10	.61
Martha Spaulding aid	8,828.26	441.41
Frederick Douglass scholarship aid	8,503.11	425.16
Francis B. Schoals scholarship aid	6,000.00	300.00
William E. Dodge scholarship aid	5,000.00	250.00
John W. Alvord scholarship aid	4,000.00	224.00
Pomeroy scholarship	2,500.00	125.00
Mary B. Patton scholarship aid	1,200.00	60.00
Horace Ford scholarship aid	1,000.00	50.00
J. K. McLean scholarship aid	1,000.00	50.00
Orange Valley Church scholarship aid	1,000.00	50.00
Wm. W. Patton scholarship aid	1,000.00	50.00
Thomas Cropper Riley scholarship aid	1,000.00	50.00
Lincoln memorial prize scholarship	700.00	35.00
Edward Smith textbook aid	500.00	25.00
J. P. Thompson scholarship aid	260.00	13.00
Caroline Patton Hatch student aid	200.00	10.00
Commercial (normal) department aid	107.00	5.35
General scholarship or student aid	19,511.32	1,245.57
Total funds	309,413.71	13,154.87

RECAPITULATION.

Endowment funds.	Principal.	Income.
Professorships	$69,983.10	$3,423.05
Scholarships and students' aid	62,309.69	3,409.49
School of medicine	15,000.00	750.00
Hartford reading room	425.00	21.25
Henry G. Maynard prize debate	500.00	25.00
Intercollegiate debating fund	88.50	4.43
Gregory prize debate	100.00	5.00
General endowment fund	161,007.42	5,516.65
Total for all purposes	309,413.71	13,154.87

REPORT OF THE SUPERINTENDENT OF THE CAPITOL BUILDING AND GROUNDS.

REPORT OF THE SUPERINTENDENT UNITED STATES CAPITOL BUILDING AND GROUNDS.

OFFICE OF THE SUPERINTENDENT,
UNITED STATES CAPITOL BUILDING AND GROUNDS,
September 14, 1917.

SIR: Presenting herewith a brief report on the operations of this office for the fiscal year 1917, I submit as preliminary to items relating to the Capitol Building and Grounds the following:

NEW WOMEN'S DORMITORY, COLUMBIA INSTITUTION FOR THE DEAF.

This building, designed to furnish additional accommodation for students of this institution, was provided for originally in the sundry civil act approved July 1, 1916. The appropriation made was $90,000. A further appropriation of $53,000 was made in the general deficiency bill approved September 8, 1916.

At the date of this report the construction has reached a point where the roof is nearly completed, the partitions, grounds, and all electrical and plumbing roughing in work installed, and the interior ready for plastering. All important contracts have been arranged for. The greater portion of this work, however, is being carried out by the Government, contracts being made for material, the same being put in place by skilled labor employed by this office.

COURTHOUSE, WASHINGTON, D. C.

This very important work is to be carried out so that the historic building will be preserved. It is one of the landmarks of the city and its architectural beauty and historic interest led to a sentiment for its preservation which this office has successfully presented to Congress. That body has in a substantial and practical way approved. When completed, the architectural beauty will be restored in stone and the interior modernized and readjusted so as to provide for two additional courts in case they are created. The delay in the work has been the result of extended conferences with the courts and officials prior to the execution of any detailed plans, the removal of the courts and officials to other quarters and the preparation thereof to meet the judicial requirements, followed by the coming on of a winter season which prevented the removal of the roof and damage to the interior at that time. Then came the inauguration period, during which the old structure was allowed to house visiting troops.

The work is now well started, with fully agreed upon plans for the interior. The foundations around the building have been rein-

forced and added to, to receive the stone surfacing of the exterior, and part of the granite base course has been set. The main sewerage lines have been placed and duly connected. The old roof has been cut away from the exterior wall lines and supported independently, the purpose being to remove the roof in sections and replace it step by step with the new steel and concrete roof. The main steps and porticoes have been taken down and new foundations placed.

In connection with this work the general deficiency bill approved September 8, 1916, contained an appropriation of $8,000 for rental of temporary quarters and $7,500 for the removal of the courts to some building to be provided therefor. This was done in order that the reconstruction of the courthouse might not interfere with the proper judicial procedure of the court in due term. In accordance with the terms of these two provisions an agreement was entered into between the surviving executors of the estate of M. G. Emery, deceased, and this office for the rental of a certain portion of the building at the corner of B and First Streets N. W., known as the old census building. In conjunction with the courts the space rented was laid off for their accommodation and in the manner they desired. About December 1, 1916, the courts began to hold session. All the necessary furniture, etc., available in the old courthouse was removed to the census building and properly installed under this arrangement.

CAPITOL BUILDING.

STATUARY FOR THE HOUSE PEDIMENT.

Under the provision of an act for completing the pediment of the House wing of the Capitol, approved April 16, 1908, an appropriation of $75,000 or as much thereof as might be necessary was authorized to be expended under the direction of a commission consisting of the Speaker of the House, the Joint Committee on the Library, and the Superintendent of the Capitol. On February 16, 1909, a contract was executed with Paul W. Bartlett, sculptor, to furnish and erect the sculpture in place, in accordance with sketches submitted and approved by the commission. The amount named in the contract was $74,000. This contract was completed and the sculpture unveiled August 2, 1916. At the ceremonies attending the unveiling held on the lawn fronting the House pediment addresses were delivered by Hon. James L. Slayden, chairman of the House Committee on the Library; Hon. Champ Clark, Speaker of the House of Representatives; and Paul W. Bartlett, sculptor of the pediment. The exercises were interspersed by selections of music furnished by the United States Marine Band.

The bronze statue of Sequoyah presented by the State of Oklahoma and the marble statue of Uriah M. Rose presented by the State of Arkansas have been received and placed in Statuary Hall. A portrait of former Speaker Joseph G. Cannon has been received and placed in the Members' lobby of the hall of the House of Representatives.

SENATE WING.

New concrete floors have been laid in the old boiler room of the Senate wing and the ceiling kalsomined. The floors adjoining the freight lift and the Senate kitchen laid in cement. A 5-inch drainage sewer, 200 feet in length, has been constructed from the freight lift, with connections with the sub-basement of the Supreme Court. New water connections have been made with the steam table in the sub-basement and the freight lift overhauled and repaired. Necessary repairs have been made to the refrigerating system and to all elevators, including new cables for same. The legislative bell service wire in the Senate terrace has been removed and a concealed circuit substituted. In the police rooms in the Senate terrace the wood floors have been replaced with cement floors and the wooden wainscot replaced with plaster. New water pipes and heating pipes, two new lavatories, two new shower baths, and a new urinal have been installed. Five rooms in the basement and Senate terrace have been fitted with shelving, etc., for the use of the Senate stationery room, the Clerk's office of the Senate, and the use of Senators. Two sanitary drinking fountains have been placed in the main corridors, Senate wing. In the Senate library all of the rooms and bookshelves have been rewired and 110 electric-light bulbs supplied.

Painting and retouching has been attended to in the Senate reception room, the Vice President's room, the Senate Chamber, Senate stationery room, Senate restaurant, guardroom, janitor's room, Senate kitchen, and in three rooms of the Senate terrace occupied by the lieutenant of police.

HOUSE WING.

In this section of the Capitol Building the following rooms have been painted and touched up: House Chamber, Speaker's room, Ways and Means Committee room, Elections No. 2, Enrolled Bills, Railways and Canals, index room, guardroom, House restaurant, janitor's room, House substation, woodwork of the House kitchen, all corridors, and three toilets. In the committee rooms, House terrace, west side, the woodwork, ceilings, and side walls were thoroughly painted. Other repairs in this section of the Capitol include the removal of the exposed wires of the legislative bell service in the House terrace and the substitution of a concealed circuit therefor. Repairs have been made to the refrigerating machinery of the House kitchen. Wooden floors in rooms Nos. 4 and 6 in the House terrace have been replaced with cement floors and these rooms rewired. A new railing for the room of the House Committee on Labor has been put in place. Two sanitary drinking fountains have been placed in the main corridors, House wing, 750 minor repairs to fans, motors, electric wires, etc., made by the electrical department. Six hundred and seventy-two minor repairs have been made through the shops and mechanical departments.

CENTRAL PORTION.

In the Supreme Court section of the Capitol Building repairs have been made to the fireplaces in the Supreme Court room. In the conference room the flue has been remodeled for the purposes of ventila-

tion, marble wainscoting and a new partition erected in the toilet rooms, new traps installed and new doors placed in the openings under the conference room. One new toilet has been placed in the sub-basement, and additional toilets and lavatory installed in the north corridor for the use of the Justices of the Supreme Court. A new lavatory has also been placed in the office of the clerk of the Supreme Court. In all of the rooms of the Supreme Court and in the corridors and toilet rooms, painting and retouching has been done as needed. The elevator of the Supreme Court has been thoroughly overhauled and repaired, and the elevator shaft extended to include the sub-basement level.

In addition to the repairs referred to in other portions of this work considerable work has been done in the direction of safeguarding the Capitol from entrance in directions hitherto insufficiently protected. It has therefore been deemed necessary to fasten down with iron plates all manholes, coal holes, and similar openings, 93 in number, place in position 72 area gratings, install steel gratings over the subway vents and air ducts, and install in various places 7 pairs of steel doors.

CAPITOL POWER PLANT.

Successful operation during the past fiscal year can again be reported of the Capitol power plant. The financial statement relating to this plant, and appended hereto, is a practical story of its mechanical operation which together with the service rendered to Congress has been satisfactory.

COURT OF CLAIMS BUILDING.

Extensive repairs have been made to the Court of Claims Building during the past fiscal year. These repairs include the painting of all exterior and interior woodwork, the walls of the light shafts, the tin roofs and cornices, and all the walls and ceilings of the various rooms and offices. A new automatic elevator has been installed for the use of the judges and officers of the court, five new toilets have been installed, new hardwood floors laid, ceilings in the court room and clerk's office have been reconstructed, passageways constructed across light shafts on the second floor, windows opened in light wells, new glass panel doors installed, new doorframes and window sash put in place, five windows lowered, two casement windows opened in the front of the building, the brick cornice of east wall relaid, a new brick wall and entrance to coal cellar made, the heating plant overhauled and repaired and new radiators installed.

ENGINE HOUSE, SENATE AND HOUSE STABLES.

All the plumbing of the House stables has been overhauled, new fixtures have been installed, and the needed repairs to doors, roofs, windows, floors, etc., made. The interior of the stables has been reconstructed for garage purposes for the use of the auto-machines of the House of Representatives.

CAPITOL GROUNDS.

Improvements in the Capitol Grounds comprise the thorough spraying and trimming of the trees, the repairs to walks and driveways, the seeding, sodding, and fertilizing of the lawns, the care of the plant cases of the terraces, planting and trimming of shrubbery, necessary repairs to the water and sewerage system, and the change of the lighting system from arc and incandescent lamps to modern nitrogen incandescent lamps. New lamp posts have been supplied when necessary and 28 high-power lamps have been installed on the terrace. Six smaller lights have also been placed at the east front of the Capitol, and four near the John Marshall statue at the foot of the west stairways.

UNITED STATES BOTANIC GARDEN.

Mr. George W. Hess, superintendent, reports as follows:

The annual distribution of plants, trees, shrubs, etc., by and through the authority of Congress, was carried on as usual. This distribution has gradually increased from year to year with the result that the Botanic Garden is now contributing largely to the beautification of the country at large, shipments being made to every State in the Union, and to Hawaii.

The following donations are hereby acknowledged: Mr. Schmidt, Horticultural Hall, Philadelphia, Pa., species of Abutilon and Achryanthes; Mr. Pierre Van Landeghem, Purdue University, Lafayette, Ind., seeds and tubers of Nymphæa, hybrid Freezia, Amaryllis, and Gesneria; Robert Craig Co., Philadelphia, Pa., collection of Gardenias and Impatiens; John Scheppers Co., New York, N. Y., bulbs; Richard Diener Co., Kentfield, Cal., collection of rare gladiolus, petunias, and Delphinum; Brooklyn Botanical Garden, Brooklyn, N. Y., collection of Nephrolepis; Mr. T. W. Leach, New Jersey, collection of dahlia tubers.

A collection of 32 hardy ferns was purchased and planted in the rockery in front of the superintendent's office.

The trees and shrubs were given their usual spring and fall spraying, and the necessary pruning.

Greenhouse No. 5, south side of Maryland Avenue, was completely remodeled. The roof was raised about 2 feet and side ventilators installed, new benches were constructed and new water pipe laid, the entire structure was given two coats of paint inside and out. This is one of the best and most modern houses on the premises.

The valley around the superintendent's office was replaced by a new one, and the roof renewed where needed. The entire exterior of the structure was given two coats of paint.

A partition was constructed in greenhouse No. 4, north side of Maryland Avenue, to keep the moisture from penetrating the adjacent wall of the superintendent's residence. New benches were also constructed in this house.

The roof of the main conservatory was treated with Permanite, a special greenhouse putty, thereby making the structure watertight. The entire exterior of the house was given one coat of paint.

All minor repairs to greenhouses, heating apparatus, and cold frames have been carried on from time to time as necessary.

Respectfully submitted.

ELLIOTT WOODS,
Superintendent U. S. Capitol Building and Grounds.

The SECRETARY OF THE INTERIOR.

EXPENDITURES.

Capitol Building and repairs, 1917.

Pay rolls and vouchers	$17,459.06
Machinery and ironwork	3,245.97
Brushes, sponges, soap	798.55
Lumber and millwork	2,056.68
Hardware	1,196.93
Lime, brick, cement, sand	236.81
Paint, oil, glass	2,091.26
Stone and marble work	132.25
Legislative bell service	202.96
Drawing, photo, and blue print material	311.66
Office vehicle, gasoline, etc	945.11
Hauling, telegrams, expressage	36.01
Plumbing material	1,088.14
Elevators and repairs	1,148.42
Roofing and tin work	177.21
Repairs ranges, etc	187.04
Tile and tiling	74.25
Stationery and books	164.25
Flags	173.96
Miscellaneous	72.38
Reserved for unpaid bills	1.10
	31,800.00
Amount appropriated sundry civil bill, approved July 1, 1916	30,000.00
Amount appropriated deficiency bill, approved April 17, 1917	1,800.00
	31,800.00

Improving the Capitol Grounds, 1917.

Pay rolls	$24,437.57
Removing snow	210.21
Plants and seeds	508.00
Fertilizers	1,044.45
Tools and machinery	205.03
Brushes, brooms, etc	325.86
Soil and sod	110.00
Motor and hand mowers	428.76
Cement, lime, etc	162.80
Plumbing materials	113.50
Paving and repairs	150.00
Freight and express	36.18
Hose and couplings	227.60
Lumber	264.66
Trees	25.40
Ironwork, railings, etc	1,626.58
Reserved for unpaid bills	123.40
	30,000.00
Amount appropriated sundry civil bill, approved July 1, 1916	30,000.00

Engine house, Senate and House stables, 1917.

Pay rolls	$1,220.15
Lumber and millwork	68.55
Hardware	35.25
Paint, oil, and glass	11.21
Roofing and tin work	8.40
Cement, brick, sand, etc	15.50
Plumbing material	19.27
Reserved for unpaid bills	121.67
	1,500.00
Amount appropriated sundry civil bill, approved July 1, 1916	1,500.00

Capitol power plant, 1917.

Pay rolls	$73,769.71
Office supplies and expenses	40.68
Power-plant building	2,156.36
Miscellaneous power-plant equipment	2,458.60
Turbines and motor generators	245.47
Switchboards and equipment	44.54
Boilers and stokers	2,317.85
Coal and ash handling equipment	30.59
Miscellaneous steam equipment	1,544.43
Storage-battery equipment	31.10
Pumping station and waterway	748.68
Steam transmission and tunnel	133.48
Electric transmission, ducts, etc	104.72
Electric apparatus and accessories	810.23
Wire and material	9,013.94
Fixtures	832.30
Incandescent and arc lamps	8,025.22
Hauling, express, telegrams, etc	12.56
Gas and electric current	887.73
Fuel, oil, and waste	99,282.89
Advertising	151.42
Traveling expenses	122.04
Reserved for unpaid bills	3,059.46
	205,824.00
Amount appropriated sundry civil bill, approved July 1, 1916	172,924.00
Amount appropriated deficiency bill, approved Apr. 17, 1917	32,900.00
	205,824.00

New women's dormitory, Columbia Institution for the Deaf.

STATEMENT OF APPROPRIATIONS, EXPENDITURES, ETC., TO JUNE 30, 1917.

EXPENDITURES.

Excavation	$3,072.98
Concrete footings and foundations	3,850.46
Rough brickwork	16,041.20
Exterior stonework	2,557.95
Steel framing, floors, roof, etc	11,525.94
Terra-cotta partitions and floors	5,397.16
Steam heating	1,738.61
Plumbing, standpipes, etc	6,806.88
Plastering and grounds	361.75
Windows, doors, etc. (exterior)	1,866.96
Electrical work and chandeliers	1,908.18
Painting	339.70
Architects and engineers	4,770.00
Draftsmen and assistants	100.00
Drafting material and blue prints	103.72
Office force, watchmen, foremen, timekeepers, constructors, and expenses	5,718.03
Traveling expenses	2.60
Advertising and printing	15.65
Technical books and instruments	262.00
Telegraph telephone, hauling	158.78
Contingent	33.38
Storehouse, tools, fence, constructor's office	1,229.35
Temporary quarters	2,990.48
Preliminary—wrecking old building	2,328.38
Windows, doors, etc. (interior)	872.28
Balance reserved for outstanding contracts	68,947.58
	143,000.00

APPROPRIATIONS.

Sundry civil bill, approved July 1, 1916	$90,000.00
General deficiency bill, approved Sept. 8, 1916	53,000.00
	143,000.00

Reconstruction of courthouse, Washington, D. C.

STATEMENT OF APPROPRIATIONS, EXPENDITURES, ETC., TO JUNE 30, 1917.

EXPENDITURES.

Excavation	$1,700.00
Concrete footings and foundations	4,402.94
Steam heating	75.00
Plumbing, standpipes, etc	4,090.05
Windows, doors, etc	27.00
Architects and engineers	9,696.00
Drafting material and blue prints	443.24
Office force and expenses, foremen, timekeepers, constructors, watchmen, etc	3,294.60
Advertising and printing	69.94
Technical books and instruments	96.56
Telephone, telegraph, hauling	51.92
Contingent	32.15
Sheds, storehouse, tools, etc	74.27
Preliminary, wrecking, demolition, etc	3,021.31
Balance	322,925.02
	350,000.00

APPROPRIATIONS.

Deficiency bill, approved Sept. 8, 1916	150,000.00
Sundry civil bill, approved July 1, 1916	200,000.00
	350,000.00

Temporary quarters, courthouse, Washington, D. C., 1917–18.

JUNE 30, 1917.

EXPENDITURES.

Partitions, including painting	$2,121.13
Temporary lockup and vaults	252.60
Plumbing, standpipes, etc	218.00
Plastering and grounds	1.92
Windows, doors, frames, etc	354.15
Electrical work, etc	681.35
Painting	603.75
Telephone, telegraph, hauling furniture, etc	3,913.14
Reserved for outstanding contracts	1,353.96
	9,500.00

APPROPRIATIONS.

General deficiency bill, approved Sept. 8, 1916	7,500.00
Urgent deficiency bill, approved Dec. 22, 1916	2,000.00
	9,500.00

REPORT OF THE DIRECTOR OF THE NATIONAL PARK SERVICE.

ANNUAL REPORT OF THE DIRECTOR OF THE NATIONAL PARK SERVICE.

DEPARTMENT OF THE INTERIOR,
NATIONAL PARK SERVICE,
Washington, October 13, 1917.

SIR: I have the honor to submit the following report of the activities of the National Park Service during the past year.

NEW BUREAU ORGANIZED.

The National Park Service was organized as the ninth bureau of the Department of the Interior immediately upon the approval of the deficiency appropriation act of April 17, 1917,[1] which made funds available for its establishment. Mention of the act of Congress of August 25, 1916,[2] creating the new form of administrative machinery for the management of the national parks was made in your report for 1916, and an abstract of the important sections of the law was published therein for the information of the public. However, to briefly summarize again the principal provisions of this legislation which forms the solid foundation for all future development of the park and monument system and governmental participation in the movement to stimulate and encourage American tourist travel, would not, I venture to suggest, be uninteresting here because of the repetition of facts.

Provision is made in the law for the establishment of the new bureau, which is placed under the supervision of a director appointed by the Secretary of the Interior. Authority is also granted for the appointment of an assistant director, a chief clerk, and such other employees as the Secretary may deem necessary. An indirect limitation on the organization of the service, however, is contained in a clause inhibiting the appropriation for the Washington offices of more than $19,500 in a single fiscal year, without special authority of the National Legislature. The act also specifically charges the director of the service with the supervision, management, and control of the several national parks and national monuments already under the jurisdiction of the Department of the Interior, and especially refers to the Hot Springs Reservation in the State of Arkansas as a part of the park system.

FUNCTIONS OF THE NATIONAL PARK SERVICE.

The eloquent statement of the functions of the new service is an important feature of the act, but it can hardly be summarized without loss of clearness in the expression of sentiment and without

[1] Public No. 2, 65th Cong. [2] 39 Stats., 535.

detraction from the forcefulness of the sentence structure. I will therefore quote the statement from the law itself:

> The service thus established shall promote and regulate the use of the Federal areas known as national parks, monuments and reservations hereinafter specified by such means and measures as conform to the fundamental purpose of said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein, and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.

What a brilliant statement of constructive conservation policy this is. What a field of endeavor in the public service it prescribes for this new bureau. What benefits for the people of our time and for posterity in the direction of safeguarding health and providing recreational facilities are promised. What splendid recognition is given to the economic and educational value of our wonderful playgrounds. The statement breathes hope and encouragement and inspiration to all who study, enjoy, and love the wild places and the sublime works of nature.

The organic act then goes on to authorize the promulgation of rules and regulations for the use and management of the parks and monuments and prescribes the penalties that may be imposed for the violation of such rules and regulations. Provision is made, too, for the leasing of park lands and the granting of permits for the use of these lands for the accommodation and entertainment of visitors. The unusual conditions under which timber may be cut, under which animals may be killed, plants destroyed, etc., and under which grazing of live stock may be permitted are also included in the law.

The officers appointed by you to organize and manage the new service are: Director, Stephen T. Mather, of Illinois, former assistant to the Secretary of the Interior; assistant director, Horace M. Albright, of California, former assistant attorney of the Interior Department; chief clerk, Frank W. Griffith, of New York, formerly attached to the office of the chief clerk of the department.

It is with regret that I record at this point a serious illness of Director Mather, which has necessitated an extended absence from Washington and the temporary assumption of his duties by the assistant director. His recovery is now regarded as complete, and he will be at his desk again within a very short time.

Quarters in the new building of the Interior Department were assigned to the service, and it now occupies the south section of the fourth floor, east wing. The temporary organization of the former field establishment under the direction of the Superintendent of National Parks, authorized by Congress under date of February 28, 1916,[1] to be located in Washington, was absorbed by the new organization, and the office of Superintendent of National Parks was abolished. The last incumbent of this office, Mr. R. B. Marshall, had resigned on December 31, 1916, to resume his duties as chief geographer of the United States Geological Survey.

DAWN OF A NEW ERA.

Thus the national park system came to possess the machinery for its government that it has required for decades. Thus the old method of managing these great recreational areas in a subdivision of the

[1] 39 Stats., 23.

Secretary's Office in common with a multitude of miscellaneous reservations, eleemosynary institutions, etc., has passed, and all temporary expedients adopted for the improvement of the national park administration have been eliminated or crystallized into permanent form in the organization of the new service. In the past, each park and each monument was administered with no definite relationship to other members of the system. Each was established by organic laws or proclamations that differed widely in their provisions and in the application of authority contained in them to problems of administration. There was scarcely an opportunity to harmonize any of the many conflicting principles, and as the supervisory officers in Washington could only give the parks and monuments incidental attention, a correlation of methods of management was impossible. Indeed, the operation of the whole park system was unbusinesslike and unsatisfactory.

We stand now in the light of a new order of things, but as we gaze back from the threshold of the future to the efforts of the past, accomplishments of large importance gather before us and we recognize in them tremendous influences that will wisely guide us in our onward and upward steps. As I have intimated, these accomplishments are the results of farsighted efforts on the part of men who were burdened with details of other governmental interests in addition to those of the parks themselves. In the activities of the new service their efforts and their achievements will not be forgotten nor minimized.

THE JURISDICTION OF THE NATIONAL PARK SERVICE.

There are now 17 national parks and 22 national monuments under the jurisdiction of the National Park Service. The total area of the national parks is 6,254,568 acres, and the total area of the monuments is 91,824 acres. (See map opposite page 880.) All of the national parks were created by act of Congress or by presidential proclamation under special authority of an act of Congress. All of the monuments were established by presidential proclamation under the act of June 8, 1906,[1] entitled "An act for the preservation of American antiquities." The names of all of these parks and monuments are given on pages 100 to 103 with a brief statement of their characteristics, their locations, the dates of their establishment, and other interesting data relating to them.

BIRTH OF THE NATIONAL-PARK IDEA.

The first national park to be set apart was the area embracing the hot springs of Arkansas. The reservation of this land was made April 20, 1832.[2] However, it was nearly 50 years after the act of reservation before steps were taken to develop the park in the public interest. In the meantime the remarkable area which is now Yellowstone Park had been discovered and explored, and the famous Washburn-Langford party in its camp near the junction of the Firehole and Gibbon Rivers[3] in the Yellowstone region had conceived of the

[1] 34 Stats., 225.
[2] 4 Stats., 505.
[3] Chittenden, Gen. H. M., The Yellowstone National Park, 1915 edition, p. 60 et seq. Langford, N. P., The Discovery of Yellowstone Park, p. 115 et seq.

"national park" idea,[1] placed a broad unselfish, public-spirited construction upon the term, and had brought the wonders of the region and the splendid patriotic national-park plan to the attention of Congress, with the result that, on March 1, 1872,[2] Yellowstone National Park was established. Forty-five years have passed since that legislation was enacted and in that lapse of time other parks have occasionally been carved out of the public domain for the benefit and enjoyment of all the people. The seventeenth and youngest member of the system is the Mount McKinley National Park, which was established by the act of Congress approved February 26, 1917.[3]

The first national monument to be established was the Devils Tower Monument, in northeastern Wyoming. It was set apart from the public domain on September 24, 1906,[4] a few months after the passage of the act authorizing the creation of this type of reservation by presidential proclamation. Since that date 21 other monuments have been placed under the jurisdiction of the Secretary of the Interior. The monument most recently added was the Verendrye National Monument, in North Dakota, established by President Wilson upon your recommendation, in a proclamation dated June 29, 1917.[5] There are, in addition to these 22 monuments, 13 others on reserved public lands beyond the Mississippi River, 11 of which are under the Forest Service of the Department of Agriculture and 2 under the control of the War Department. Lists of these monuments, with their special characteristics, will be found on pages 102 and 103. Two monuments, Lassen Peak and Cinder Cone, formerly under the jurisdiction of the Department of Agriculture, have been included in the Lassen Volcanic National Park and thus transferred to the control of this Service. The monuments over which we have no jurisdiction are in national forests or in military reservations, and were placed under the control of the Secretaries of Agriculture and War, respectively, because they have supervision of the territory immediately surrounding them. I shall make another reference to this division of control.

NATIONAL PARKS AND MONUMENTS NOW PRACTICALLY IDENTICAL.

The distinction between national parks and national monuments is not easy to comprehend, especially when one considers the status of the Grand Canyon of the Colorado River and, for instance, the Yosemite region. Both possess scenic features of equal sublimity, yet the Grand Canyon is a national monument and the Yosemite region is a national park. The National Park Service act makes no distinction between the two reservations in its provisions for their development for tourist patronage. The act merely refers to the different classes of reservations by name, but does not define them. In another connection I have already mentioned the chief difference between the two types of reserved areas.[6] It is to be found in the methods of reservation employed. The national parks are established by act of Congress, the monuments by presidential proclama-

[1] Chittenden, Gen. H. M., Yellowstone National Park, 1915 edition, Chap. X. Langford N. P., Discovery of Yellowstone Park, p. 117.
[2] 17 Stats., 32–33, Secs. 2474–2475, R. S.
[3] 39 Stats., 938.
[4] 34 Stats., 3236.
[5] 40 Stats. Proc., 1380.
[6] Supra, p. 3.

tion. Generally speaking, the monuments are smaller areas than the parks and are not entitled to the same consideration by Congress that the latter enjoy. Moreover, they do not receive the same consideration that the parks are accorded. On the other hand, there are a few monuments of enormous area that deserve a larger degree of attention than some of the smaller national parks. There are monuments that should be made national parks, and all of the monuments would mean infinitely more to the American people if their funereal surname could be changed.[1]

PARKS AND MONUMENTS SHOULD BE ADMINISTERED BY THE SAME AUTHORITY.

As I have already pointed out, 13 of the national monuments are under the jurisdiction of the Secretaries of Agriculture and War because they have control of the national forests and military reservations, respectively, in which these monuments are located. Some economies in administration, doubtless, may be effected by dividing the jurisdiction over these reservations, but their management as a part of the national park system and their promotion as points of interest for tourists to see and enjoy seem so essential that the apparent reason for the original division of control of reservations of this character becomes of little consequence in comparison with the advantages to be gained by bringing all of the parks and monuments together for development under a single authority.

The National Park Service has broad powers that it may employ in the development and promotion of national monuments. The language of the National Park Service act places both parks and monuments upon the same basis so far as their administration is concerned. They are, from every point of view, in the same status. Furthermore, Congress has recognized the necessity for developing the monuments under this service and has already made several substantial appropriations for their improvement.[2] Would it not be the logical thing to place all of the monuments under the department that is most interested in their promotion? It would be entirely possible to effect economies in protection of several of the monuments now under the control of other departments through cooperation with them while the reservations themselves are being managed and developed under this department.

For instance, the Devil Postpile Monument in California includes within its boundaries some of the choicest bits of scenery in the Sierra Nevada Mountains. The wonderful basaltic formation known as the Devil Postpile stands in the northern section of the monument near the bank of the Middle Fork of the San Joaquin River. The river at this point is very beautiful; there is a fine spring of soda water a few yards away; there are excellent camping places along the river; there are meadows where horses may be pastured; fishing in the river is always good; and 1 mile down stream from the Devil Postpile, within the limits of the monument, is Rainbow Falls, which forms the finest scenic feature of the reservation. This monument is a miniature national park; it is readily accessible from the Yosemite Park; and it should be visited by hundreds of travelers each

[1] On this point see pp. 202–203, Hearings before Public Lands Committee, House of Representatives, on National Park Service bill, Sixty-fourth Congress.
[2] See statement of appropriations, p. 1005.

year. It is not under the jurisdiction of this department, however, and there seems to be no ground for mentioning its wonders in the publications of the National Park Service. Nevertheless, the public should know about this little park and others in the same status.

ORGANIZATION AND COOPERATION.

The Devil Postpile Monument might well be patrolled by forest rangers assigned to duty in the surrounding region, while the administration of the monument could be assigned to the National Park Service. The protection of the monument would be a small matter involving a cooperative plan of service such as is necessary when the National Park Service and the Bureau of Entomology work together in the eradication of pests and diseases that attack the trees of the parks, or when the National Park Service and the Geological Survey unite their efforts to secure stream flow data, or when the Public Health Service joins representatives of the park administration in a study of sanitary conditions in a national park.

The comments that I have made upon the possibilities of the Devil Postpile Monument under national park control apply to the other reservations of the same class now under other departments. The Grand Canyon Monument, of course, should receive the status of a national park. You have recommended this action to the President and to Congress.[1] A similar change in status might be advisable in the case of the Mount Olympus Monument in Washington. There is a bill now pending in Congress to establish the Cliff Cities National Park in New Mexico. This project embraces the Bandelier National Monument.[2] All of these monuments are under the Department of Agriculture at the present time.

The necessity for consolidating the monument system under a single authority was first emphasized by Mr. Frank Bond, chief clerk of the General Land Office, who has for many years transacted business in the Land Office relating to lands reserved under the monuments act. Speaking at the First National Park Conference in Yellowstone National Park, September 12, 1911,[3] he said:

> Under existing conditions two departments are charged with jurisdiction over national monuments, and three may be. Responsibility is divided. There can be no uniformity in administration under such conditions unless there is uniformity in letting the monuments alone. * * * I believe, therefore, that not only should we have effective local custodianship, but the administration of all national monuments of whatever character, or wherever located, or however secured should be consolidated and the responsibility for their development, protection, and preservation placed where it can be made effective.
>
> It is possible that 28 national monuments, or that portion of them which needs development, do not form a sufficiently weighty trust to warrant a separate administrative unit to develop and administer them. If this be true, why not consolidate a little further? Create an administrative unit for the national monuments and national parks together. The method of creating these reserves is different, but after creation there is no evident difference between them. They are as like as two peas in a pod. Furthermore, with the exception of the ruins, any general plan of development which may be adopted for the one will be equally applicable to the needs of the other. Experience shows that there can be no effective administration for either under present methods and regula-

[1] Annual Report of the Secretary of the Interior, fiscal year ended June 30, 1915, p. 23. Report to the Senate Committee on Public Lands on S. 8250, 64th Congress, "A bill to establish the Grand Canyon National Park in the State of Arizona." This is Senate Report No. 1082, excerpts from which will be found on pages 875 and 876.

[2] S. 2291 and H. R. 3215, 65th Congress.

[3] Proceedings of the First National Park Conference, 1911, p. 100.

tions, because the time given to them is largely stolen from that assigned to other work. As a whole, they receive only incidental consideration when the public interest is great enough, and the reservations are important enough to demand a sympathetic and energetic effort directed exclusively toward solving the problems of development and administration they present.

Mr. Bond's words in 1911 disclosed an unsatisfactory condition. How much more unsatisfactory this must be to-day, when the travel to the parks and monuments is over 100 per cent greater than it was the year of the Yellowstone conference!

NATIONAL PARKS IN THE WAR DEPARTMENT, TOO.

This discussion brings me to a similar question that deserves consideration soon. It has arisen numerous times during the past year when this Service has been requested for information regarding the military national parks—where they are located, how they are reached, what trips to them would cost, etc. The question is whether these parks should not also be placed under this department in order that they may be administered as a part of the park system. The interesting features of each of these parks are their historic associations, although several of them possess important scenic qualities. Many of the monuments and at least three of the national parks[1] were established to preserve the ruins of structures that have historic associations of absorbing interest, or to mark the scene of an important event in history.

One of the chief functions of the national parks and monuments is to serve educational purposes. It is one of your announced policies that the educational value of the parks should be especially emphasized in all publications.[2] Should not the educational value of these military parks be brought to the attention of the American people through our publications? Should not travel to them be encouraged, and full information regarding accommodations for visitors in or near them, cost of trips to them, etc., be compiled for public use? At the present time the following comprise the military park system: Gettysburg, Vicksburg, Chickamauga and Chattanooga, Shiloh, and Guilford Court House National Military Parks and the Lincoln Farm National Park. The last-mentioned park, while not a military park, is administered with the other five reservations. The pending park project to include Monticello, the home of Thomas Jefferson, contemplates vesting jurisdiction of this historic place in the War Department.[3]

Mr. J. Horace McFarland, president of the American Civic Association, had this desirable consolidation of all of the national parks of the country in mind when he made the following statement before the Fourth National Park Conference in January of this year:

> We want also unification in national park management. It is now the fact that there are three departments handling national parks—an obvious absurdity.[4]

Other students of park problems have similarly emphasized the importance of this question.

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[1] Mesa Verde, Sullys Hill, and Casa Grande Parks.

[2] "It is the destiny of the national parks, if wisely controlled, to become the public laboratories of nature study for the Nation." Annual Report of the Secretary of the Interior for the fiscal year ended June 30, 1915, p. 24.

[3] H. R. 6444, by Mr. Dent.

[4] See proceedings of the Fourth National Park Conference, 1916, p. 108. See also American Civic Association Bulletin No. 6, Series 11, December, 1912.

THE ONLY PLAN OF ORGANIZATION.

Perhaps the time has not yet arrived when legislation should be enacted to harmonize all national park and monument interests and to define a general policy of administration that will make it possible to conduct a broad campaign of education with the object in view of stimulating American travel in America, particularly after the war. The following analysis of the problem, however, would seem to indicate that this time is at hand. Hundreds of thousands of Americans have, during the war, traveled in their own country and gazed upon the extraordinary scenery of the great western parks, and many of them have seen several of these wonderful scenic reservations. Others, attracted by the historic associations of parks like the Mesa Verde, with their remarkable cliff and plateau dwellings of an ancient race, have gone into the Southwest and have been amazed by what its canyons and mesas mutely display for the pleasure and edification of the visitor. But, what of the time when the war is at an end? Will not countless thousands of our people go over to Europe again, not just once or twice to see the ruin that war has wrought and tarry for a time upon the battle fields of this great struggle, but year after year; will they not harken to the call of France, Switzerland, and Italy as they did before travel on the seas became dangerous and passports difficult to obtain? Will not the warring nations, immediately upon the conclusion of peace, at once consider the economic value of the American traveler and regard the tourist business as the most important industry to rebuild with all possible speed? Will not these nations attach a greater degree of importance to this tourist travel after the war than they did before it began, and are they not looking forward confidently to the time when the $500,000,000 and more will come to them annually from this country just as regularly as interest will accrue from an American Liberty bond?

EUROPE WILL PREPARE FOR TOURIST INVASION.

If the reports that are current in this country are correct, France and other countries have already taken long strides in the rehabilitation of their tourist business.

A letter from Paris, under date of June 7, published by American newspapers about July 1, told of a decree appearing in Journal Official which created a "national office of touring," attached to the ministry of public works. The letter went on to state that the objects of this office are to "centralize" and put at the disposal of the public information of all kinds concerning touring, and to study and seek out an appropriate means for developing touring in France. It also pointed out that Americans who go to France after the war should find more comfortable lodgings and better touring facilities than have been afforded in the past. Moreover there was a tone of assurance that such accommodations and facilities would be provided, now that the Government had taken an interest in the development of tourist travel. A United States consul recently reported that France proposes to be an active bidder in the United States tourist trade after the war is over. He stated that a 5,000,000-franc company had been organized to erect, open, and maintain a chain of

hotels along the entire western battlefield, with automobile service between each hotel. He stated further that arrangements are being made to use the "all expense" tour method of inducing travel, and that hotels will be constructed and maintained along American lines. It appears also that a commission of hotel managers, financiers, and architects will visit the United States to gather facts as to the best American methods of building and conducting tourist resorts. Plans will also be made to conduct a publicity campaign that will insure the systematic dissemination of information regarding travel in France throughout the world.

SPAIN TO ORGANIZE A NATIONAL PARK SERVICE.

Representatives of the Government of Spain are also studying American methods of park administration, and it is understood that arrangements are being made for the establishment of national park areas in Spain. Reports are also available that disclose the consideration of park projects by several of the South American nations.

SWITZERLAND FINDS ADVERTISING PROFITABLE.

There never has been any cessation in Switzerland's advertising of her scenic resources. Swiss glacier scenes, Swiss mountain climbing pictures, views of Swiss alpine life still go into our schoolrooms, because our teachers are not familiar with the great glaciers of Mount Rainier and Glacier Parks nor the mountain climbing in Colorado's parks, and in the Yosemite, and because they have not experienced the thrills of living in the Rockies, the Cascades, or the Sierra. They teach the youth of the Nation about Switzerland's wonders because it is easy to obtain pictures of her natural features and data relating to them, and yet our scenic resources are more sublime than those of any other Nation on the earth. Consider for a moment our historic grounds. How much better known is almost any European cathedral that might be mentioned than Missions San Juan Capistrano and San Gabriel or other missions of California, Mission San Xavier del Bac and Tumacacori Mission in Arizona, the latter in the Tumacacori National Monument, or Gran Quivira and Acoma churches in New Mexico. And soon the majority of traveling Americans will know more about the physical environment of the battlefields of the Marne than our own hallowed Valley Forge and Yorktown. or Vicksburg, Gettysburg, and Appomattox.

TIME FOR A NATIONAL TOURIST BUREAU.

It therefore seems that the coming year is precisely the time for our Government to adopt a policy similar to those already established in the European nations, and actively encourage touring in the United States. We should supplement the work that the railroads, the automobile associations, the tourist bureaus, and the chambers of commerce are doing to encourage travel in this country. We should assist in the correlation of the activities of these agencies by active cooperation with them. There should be a fund available for the conduct of a systematic campaign of education regarding our national parks and monuments, historic points, and other features of national interest.

During the past year this Service has supplied information regarding many points of interest far from the reservations over which it has administrative control. Inquiries have been made regarding such vastly different natural features of really national importance as Niagara Falls, the Everglades of Florida, the sand dunes of Indiana, the lakes of Maine, Luray Cavern, the mountains of Kentucky, etc. These and numerous other inquiries have been satisfactorily answered. Anticipating a larger volume of general requests relating not alone to the national parks and monuments but to points of interest all over the country that would naturally attract the traveler, there is being gathered in this service a vast quantity of data for use in supplying general information of this character.

A VIGOROUS EDUCATIONAL CAMPAIGN.

The reference I have made to the desirability of initiating a very active campaign of education to acquaint the people of this country with our scenic, historic, and recreational areas with a view to inducing more extensive American travel at home must not be construed as carrying with it the inference that nothing is being done at the present time to stimulate this travel. The fact is, much has been done to advance the educational work begun over two years ago. No opportunity has been overlooked to utilize the means at our command to proceed with this work of promotion, and the result has been steady progress along broadgauge lines.

Information regarding the scenic features and accessibility of the national parks and monuments has been circulated throughout the year. Over 128,000 copies of bulletins of information relating to the national parks have been given free of charge to the public, and 83,000 automobile guide maps have been distributed for the use of the motorist during the tourist season that has just closed. Copies of the little pamphlet "Glimpses of our National Parks" numbering 117,000 passed through the mails to parties seeking general information regarding the entire park system. These various informative publications naturally stimulated the demand for the scientific pamphlets describing the special features of the park system that are for sale by the Superintendent of Documents, with the result that this latter class of publications has received during the year an unusually wide circulation.

The dissemination of all this literature began during the distribution of the National Parks Portfolio, the special illustrated production of Robert Sterling Yard, which appeared early in the summer of 1916. It will be recalled that this beautiful document was issued with the cooperation of the western railroads, and that these railroad lines subscribed $43,000 to cover the cost of printing, binding, and mailing the edition of 275,000 copies. It is pertinent to remark here that the demand for this portfolio subsequent to the completion of the distribution of the first edition has been very large. It is estimated that over 20,000 applications for this document have been received during the past year. It would have been eminently desirable to have issued another large edition of this portfolio for free distribution had funds for its publication been available.

The tremendous demand, however, for the portfolio prompted the preparation of a second edition by Mr. Yard. This new edition will

shortly be ready for sale by the Superintendent of Documents. The new portfolio will contain the nine pamphlets that composed the first series and, in addition thereto, a large new pamphlet on the national parks not covered by the first edition. It will also include a description of the national monuments under the jurisdiction of this Service. There will be many new pictures in the second edition and from every point of view it will be more attractive than its popular predecessor.

Another important addition to our sale publications that will shortly appear, is Dr. W. T. Lee's guidebook of Rocky Mountain National Park, a copiously illustrated volume which may be obtained from the Superintendent of Documents. This book will not only be a practical guide to the scenic features of Rocky Mountain Park, but will contain interesting popular descriptions of the geology of the region.

AUTOMOBILE GUIDE MAPS FOR NATIONAL PARKS.

The automobile guide maps of Yosemite and Yellowstone National Parks, which were issued for the 1916 season, met a long-felt want and largely influenced the increase in motor travel to these parks last year. Recognizing their popularity with the motorist, the Service this year issued automobile guide maps for Yellowstone, Yosemite, Mount Rainier, Crater Lake, Glacier, Rocky Mountain, Sequoia, and General Grant National Parks, and gave these maps very wide distribution. They were eagerly sought by automobilists and motor clubs in all sections of the country. The automobile guide maps have come to stay. Copies of these maps will be found in an appendix of this report,[1] and it will be noted that they not only show the automobile highways leading to the parks and the road systems within the parks themselves, but also indicate the hotels, camps, garages, and supply stations, and give other valuable data for the information of the traveler. Most of the maps are also trail guide maps, and are useful, therefore, when the saddle horse is substituted for the automobile or when the motorist goes on trails afoot.

THE MOTION-PICTURE SERVICE.

Another direction in which we have advanced our educational work has been in the motion-picture and lecture field. It has been the practice of the Service to permit the taking of motion pictures in the national parks and, indeed, to give assistance in the making of scenic film wherever practicable on condition that one positive print of all film taken should be deposited in the Service for use in educational work after a certain period of time has elapsed, during which the owner of the negative film may give the pictures such exclusive public circulation as he desires. As a result of following this practice there has been accumulated in the bureau a very large quantity of excellent scenic film which is being edited and distributed as fast as the terms under which the film is delivered to the Service permit. It is estimated that the equivalent of approximately 348,000 feet of motion-picture film was circulated during the past year and

[1] See maps opposite pp. 906, 924, 938, 944, 948, 962, 968.

numerous sets of lantern slides were maintained in use constantly. The use of the motion-picture film and the slides was granted free of charge to universities, colleges, schools, churches, commercial organizations, outing clubs, etc.

NATIONAL PARK LECTURES.

Occasionally illustrated lectures of the parks and monuments were given by officers of the Service. Under the auspices of the New York City School Department a series of free lectures, illustrated with motion pictures and lantern slides, was delivered. This important motion-picture and lantern-slide phase of the educational program, begun in a small way and always a development of modest proportions, has nevertheless stimulated an amazing demand for the extension of our service. Indeed, the demand has become so great that we are now able to loan film and lantern slides in response to only a few of the requests for the picture service. Within the last week it has been necessary to decline the requests for motion-picture film of the national parks made by the extension departments of two of the large State universities. If it had been possible to meet the requests of these two universities alone many thousands of people would have had an opportunity to gain excellent first-hand information regarding the scenic resources of America. The cost of arranging and maintaining a free motion-picture film and lantern-slide service to meet the demand on the part of universities, public schools, and churches will not be large, and yet the educational value of the service is inestimable. In the establishment of the lantern-slide service the cooperation of the western railroads has been invaluable.

TRAVELING EXHIBIT OF NATIONAL PARK PICTURES.

The experimental traveling exhibit of national park pictures is also worthy of mention at this point. Twenty-four handsome enlargements, framed, with surface treated so that the necessity for glass was obviated, packed in two specially-made cases constructed to accommodate 12 pictures each, have been sent to libraries for exhibition for limited periods, then by them passed on. The circuit, of course, is dictated from this Service. The exhibiting libraries pay all express charges. This experimental exhibit, with the shipping cases included, costs approximately $83.50 apiece. The demand for the exhibit has been amazing, and the libraries have not been content with the use of the pictures for a week each, but many have wanted them for a month. Libraries from neighboring cities are demanding them, and several inquiries from State library associations have been received. One request from the library association of a populous Middle West State called for the use of a set for two years to circulate through all the libraries of the State.

Lack of funds has made it impossible to develop this service to large proportions, yet I believe that we could put 50 exhibits into permanent circulation at once by merely announcing in library circles that they were available.

Besides library demands, we have had numerous requests from public schools for the use of the exhibit, and undoubtedly we could circulate hundreds of sets on school circuits. The success of the exper-

iment was not only complete, but overwhelming. It would be a splendid thing to establish a picture service of this character on a broad scale, but probably the cost per set of photographs should be advanced to about $100, and the exhibits should be accompanied by national park literature. The upkeep of the exhibits would be very small, as there is no glass to break and the carrying cases are designed to prevent scratching of the photographs in transit.

THE INVALUABLE HELP OF THE PRESS.

Transcending in importance the work of informing the people regarding the national parks that this Service has accomplished during the past year is the patriotic and unselfish interest in the parks and monuments that the magazines and newspapers have taken. Articles, beautifully illustrated, have appeared during the year in scores of the best magazines, and the newspapers in every section of the Nation have been most generous in their publication of news items and articles on the national parks and monuments and the work of the Service. A fairly complete bibliography of magazine articles that have appeared since September 1, 1916, will be found on page 1019. The automobile departments of many of the largest newspapers have given special attention to motoring in the parks and have lavishly illustrated their articles with maps and pictures. The same may be said of the motor magazines, and it is proper in this connection to call attention to the special consideration given to the national parks of the West in the Automobile Blue Book series for 1917. Not only are the scenic features of the parks themselves and the accommodations for travelers therein carefully described, but the routes to the parks and the highway systems in them are explained in detail. National park pictures are scattered throughout the series. Thus I might continue commenting upon the interest in the development of the park system that the publishers of the country have displayed. The Service has endeavored to cooperate in the preparation of articles and the loan of pictures for publication wherever possible.

The Conservation Department of the General Federation of Women's Clubs, under the direction of its chairman, Mrs. John Dickinson Sherman, has contained its study of national-park problems and its rendition of assistance in the dissemination of information regarding the work of the Service and the beauties of the parks and monuments.

CREATING A NATIONAL PARKS LITERATURE.

Referring again to the bibliography in the appendix of this report, and particularly to that section which refers to recent books on the parks, the following new volumes relating almost exclusively to the national park system are worthy of careful reading by all who are interested in the work of this Service or in the great recreational areas that it controls:

Your National Parks. By Enos A. Mills. Houghton, Mifflin Co., Boston and New York. 1917. Price, $2.50. Illustrated.

Glacier National Park, Its Trails and Treasures. By Mathilde Edith Holtz and Katherine Isabel Bemis. J. H. Doran & Co. 262 pages. 1917. Price $2. Illustrated.

Mount Rainier, A Record of Explorations. By Edmond S. Meany. The Macmillan Co. 300 pages. 1917. Price $2; by mail 10 cents extra. Illustrated.

The Top of the Continent. By Robert Sterling Yard. Scribners. 244 pages. 1917. Price 75 cents. Illustrated.

Going Abroad Overland. By Rev. Dr. David M. Steele. 1917. Putnams. 197 pages. Price $1.50. Illustrated.

In the Alaskan Wilderness. By George Byron Gordon. 1917. The John C. Winston Co. Price $3.50 net. Illustrated.

THE NATIONAL PARK CONFERENCE.

Before leaving the discussion of our educational work to comment upon the tourist season of 1917 reference should be made to the National Park Conference which was held in Washington, January 2 to 6, inclusive. This convention might, from one point of view, be called the Fourth National Park Conference, because in 1911, 1912, and 1915 there were conferences of park supervisors, concessioners, and other parties interested in the development of the national park system called by the Department of the Interior at different points in the Western States, and this last conference was also called for the purpose of gathering together similar classes of interested people. On the other hand, the Washington conference was so vastly different in its scope that it robbed the gathering of practically all resemblance to those that had been held before. The excellence of the program and the broad scope of the discussions of this conference are worthy of enthusiastic comment, but the program itself outlines the story so eloquently that I have included it in this report. In lieu of writing more I call attention to pages 1041–1043, where the document is printed in full.

The conference was held in the new National Museum and was participated in, as the program indicates, by scientists, educators, Members of Congress, high officials of the executive departments, journalists, lecturers, and men and women of national prominence in many walks of life. The needs of the national park and monument system were considered from every point of view. Desirable legislation looking toward the improvement of the system was carefully considered. The future needs of the Service and its future avenues of progress were defined and analyzed. Especial attention was given to the advancement of touring in the United States, and in all of the discussions that were held there were the gratifying notes of deep interest and sincerity of expression. The advice and encouragement delivered at this conference will long guide and influence the officers of this new Service in the performance of their official duties, and the proceedings of the conference in published form will be pointed out in future years as the repository of basic ideas that have bettered the administration of the national parks and the national monuments and advanced their interests in other important directions.

FIRST EXHIBITION OF NATIONAL PARKS PAINTINGS.

In connection with the Washington conference there was opened in the gallery of the National Museum the first exhibition of national parks paintings. Twenty-eight canvases by artists of distinction were displayed in the gallery from the evening of January 2 until after the inauguration on March 5. A list of the paintings will be found on page 1043. The exhibition was opened by a reception which

was attended by all who participated in the conference discussions and by many high officials of the Federal Government and their wives. The exhibition was an inspiring one and was, we hope, the forerunner of what may in the future become an annual event.

The Washington conference, the distribution of the information circulars, the automobile guide maps and other pamphlets, the circulation of the motion-picture films and the lantern-slide series, the lectures, the work of the General Federation of Women's Clubs, the distribution of railroad literature, and, most important of all, the dissemination of information by magazines and the newspapers, all combined to complete the great cooperative work of inducing travel to the parks and monuments during the 1917 season. After all, then, it is not surprising that the volume of travel in them was heavier this season than ever before.

AN UNFORTUNATE REPORT.

Persistent reports that the Government regarded it as inadvisable for the people of this country to travel for pleasure during the war because such unnecessary movements would congest trains and interrupt traffic; that railroads would not quote excursion rates during the 1917 season; and that some or all of the national parks would be closed, threatened for a time to discourage tourist travel. The unusual delay in issuing the announcement of the excursion rates for the summer, especially by the eastern railroads, served to give a degree of authenticity to these reports that seriously disturbed the organized party business for the season. Furthermore, there was some apprehension regarding the effect that the pending war tax bill would have upon the national park transportation rates. This was probably due to a general understanding that transportation tickets of all kinds would be taxed. The war tax bill, of course, never at any time carried a provision for taxing excursion or other tickets covering service in the national parks. Nevertheless, these rumors, uncertainties, and delays influenced summer plans. Recognizing the disturbing nature of these forces, you authorized on May 2 the issuance of a general statement that had the instantaneous effect of clarifying the situation. The following vital paragraphs of this statement were accorded special consideration by the press:

> When asked to-day whether the national parks are to be closed to visitors during the season of 1917, Secretary Lane stated that the persistent rumors which have been current for the past few days, particularly in the Middle West, that such action was to be taken by the Interior Department, have absolutely no foundation in fact. All of the parks are to be opened at the usual time.
>
> The Secretary believes that the entrance of the United States into the war will not materially affect western tourist travel, and expressed the conviction that the national parks will be quite as well patronized this year as they have been during each of the past two years, when upward of 400,000 people visited them. He pointed out that it is even more important now than in times of peace that the health and vitality of the Nation's citizenship be conserved, that rest and recreation must materially assist in this conservation of human tissue and energy, and that the mountainous regions of the national parks offer opportunities in abundance for thoroughly enjoying a vacation of long or short duration.

It is interesting to point to the prediction of the second paragraph, that the parks would be patronized during the 1917 season quite as extensively as they were during the past two years. The prediction has been splendidly realized.

ENORMOUS INCREASE IN PATRONAGE.

The total travel to the national parks for the season was 487,368. The analysis of this figure, showing the travel by parks, will be found in the table on page 974. Necessarily the element of conjecture could not be wholly eliminated in the compilation of the travel figures, because in some parks it is very difficult to count or check the number of visitors entering their gates. In practically all the parks, however, the count of visitors has been absolutely accurate and estimates have been made in only a few instances. Where we have estimated the travel, we have carefully checked the hotel registers and employed other sources of information that made only slight inaccuracies in the counts possible. In the case of Rocky Mountain National Park, where such an amazing increase in tourist travel is shown, as estimated, an actual count of tourists was made between July 1 and October 1, and an estimate for the travel prior to July 1 is the only particle of guessing that required checking from the hotel registers. Because this estimate was necessary the final figure unavoidably appears as an estimate, but nevertheless it is a very accurate calculation, and one that is entitled to full credit.

I shall not comment upon the national monument travel further than to state that it has materially increased. The Sieur de Monts Monument, in Maine, enjoyed a very large patronage, approximately 53,750 people having entered the reservation prior to October 12. Muir Woods Monument, in California, was visited by approximately 26,000 people during the season.

The enormous increase in national-park patronage does not represent merely an increase in local travel; that is, travel from various park States and immediately adjacent territory. It represents an increase in both local travel and in patronage of tourists from distant States and foreign countries. The tourist traffic of the railroads possibly did not increase, but it is not probable that it decreased appreciably. Many of the railroads enjoyed an increased tourist patronage.

Private automobile traffic increased tremendously in every park. Of this motor traffic I shall have more to say.

MANY VISITORS FROM ABROAD.

There was a very gratifying increase in the number of citizens of foreign countries who visited the parks during the season. In almost every park I personally met citizens of the South American Republics enjoying the playgrounds of the United States for the first time, and at El Portal, Cal., on the 17th of August, I had the honor of welcoming to the Yosemite National Park, on your behalf, Viscount Ishii and other members of the Imperial Japanese Commission. The distinguished commission, accompanied by Hon. Breckenridge Long, Third Assistant Secretary of State, Mr. Gavin McNab, of San Francisco, representing the President, Mayor James Rolph, jr., and several other prominent officials and professional and business men of San Francisco, spent the day motoring in the park.

Señor Don Luis Sanguino, representing the Government of Spain, spent several weeks in the national parks studying administrative methods and the protection of the forests and wild life. Mr. Van

Tienhoven, of Amsterdam, who has been for several years a leader in a public enterprise to conserve important natural features of the Netherlands, went through several of the larger parks on his way to Australia.

ASTONISHING INCREASE IN PARK-TO-PARK TRAVEL.

Our travel reports also disclose an astounding increase in what we choose to call park-to-park travel. Hundreds of parties during the past summer visited more than one national park; just how many, it is impossible, of course, to ascertain, and scores visited groups of parks, such as the parks in the Rocky Mountains, the Pacific coast parks, the northwestern parks, the southwestern members of the system, etc. I had the pleasure of meeting one party that visited 10 national parks and the Grand Canyon Monument. This tour consumed the entire summer and was enthusiastically proclaimed by the members as an indescribably wonderful trip. I met another party of four ladies, residents of Indiana, who started west early in the spring and visited, before the middle of July, six national parks and Alaska. These ladies traveled alone. They assured me that their trip had been the most comfortable, the most enjoyable, and yet the most thrilling journey that they had ever experienced. The Massachusetts Forestry Association, which made an extended trip, including visits to six national parks and the Grand Canyon Monument, is another party that enthusiastically indorses the park-to-park tour.[1] Arrangements for the trip of this association were made by Dr. Clinton L. Babcock, formerly of the Bureau of University Travel, the organization which promoted an extensive park tour last year. These and many other parties traveled between the parks by train.

SUBSTANTIAL HELP OF THE RAILROADS.

The railroads encouraged these park-to-park trips. The three national park trip of the Chicago, Burlington & Quincy Railroad, including Rocky Mountain, Yellowstone, and Glacier National Parks, and the "two national parks in two weeks" trip (Yellowstone and Rocky Mountain National Parks) of the Chicago & North Western and Union Pacific lines are instances of the efforts of the railroads to stimulate tourist travel to more than one park during the summer season. Practically no western railroad confined itself to promotion of travel to one particular park. The Northern Pacific Railway encouraged travel to Yellowstone and Mount Rainier National Parks. The Great Northern Railway promoted Glacier National Park and Lake Chelan in the Cascades. The Southern Pacific lines induced travel to Yosemite, Sequoia, Lassen Volcanic, and Crater Lake National Parks, and also to Roosevelt Dam via the Apache Trail, and to Lake Tahoe in connection with park trips. The Santa Fe promoted both the Yosemite National Park and the Grand Canyon Monument. The Denver & Rio Grande Railroad extensively advertised the Mesa Verde National Park, the Colorado and Wheeler National Monuments, and offered various side trips to Taos and the Cliff Dwellings of the Pajarito Plateau. The Chicago,

[1] See itinerary of the Massachusetts Forestry Association, p. 1046 et seq.

Milwaukee & St. Paul system encouraged travel to both Yellowstone and Mount Rainier National Parks. The Chicago, Rock Island & Pacific lines devoted attention to the inducement of travel to several of our national playgrounds. The same may be said of the activities of the Missouri Pacific system and the Iron Mountain lines. The Salt Lake route began the promotion of Zion Canyon (Mukuntuweap National Monument) and other monuments in southern Utah. The Union Pacific system also aided in the development of travel to Mount Rainier Park and Zion Canyon in addition to the attention that it gave the Yellowstone and Rocky Mountain regions.

The tourist bureaus and commercial organizations of the West have joined the railroads in making the national park system the general inducement for western travel, establishing them as the "permanent expositions" of the West, as they were designated in 1915 in a speech made by Director Mather in San Francisco.

The work that the travel bureaus of the express companies have done in the way of encouraging American travel in the park system is also worthy of special mention. A very useful pocket guidebook of the national parks, which includes the authorized rates for the 1917 season, was issued early in the spring by the Wells Fargo Express Co. and very wide circulation was given to it.

PHENOMENAL MOTOR TRAVEL TO THE PARKS.

Let us examine for a moment the chart on page 988, which graphically analyzes the automobile travel in the national parks during the past four seasons, and then turn to page 975, where the motor travel statistics are analyzed by parks. What an astonishing increase in the number of cars in the national parks is shown by these tables, and yet these figures tell scarcely anything of the story of the 1917 motor travel in the park system. Moreover, the story can not be told, because there is not the space in this report to devote to it. Many pages might be written on the automobile routes to the various national parks and the accommodations that have been provided for the traveler along the way. Detailed descriptions of the big free automobile camps maintained by the cities along these routes would be most interesting. The efforts of the automobile clubs, highway associations, and other organizations to accurately and completely sign the roads, leading over mountain and plain, are worthy of extended comment, and the projects of the State highway commissions, involving extension and improvement of road systems, are closely related to the subject of motoring in the parks, and I regret sincerely that they can not be outlined here. Briefly, I may state that the highways in national park States have been greatly improved during the past year.

INCREASE OF FREE AUTO CAMPS.

The free automobile camp idea in its various phases, as first adopted by Denver, Colo., Ashland, Oreg., Cody, Wyo., and other cities near large parks, has been developed and extended until scores of cities now have comfortable, completely equipped camps that are placed at the disposition of the automobilist free of charge. The only charge exacted at any auto camp is a nominal rate for fuel. Park-

ing space, water, toilet facilities, and cooking grates are free. Many cities even omit the fuel charges. It is an inspiring sight to go into a park, like the beautiful city park of Denver, and see several hundred cars neatly parked in their allotted spaces and their happy owners, many of them with large families, enjoying the camp life or recreational facilities of their surroundings. I went into numerous camps of this kind during the summer and talked with the tourists. In this way I was impressed deeply with a function of this institution that had never occurred to me before. The few days spent in the free public auto camp of a big city park were giving hundreds of families from farms and small towns the opportunity to enjoy its advantages for the first time. The day will soon come when tens of thousands of cars from all over the United States will be found in these western city parks en route to one or more of the national parks. The maintenance of these free camps is another instance of the cooperation of the chambers of commerce, tourist bureaus, and civic associations with this Service in its efforts to encourage the use of the national parks.

HEARTY HELP FROM ASSOCIATIONS.

The work of signing the automobile highways in the Western States has kept pace with the improvement of the highways themselves. During the season of 1917 motoring between the parks was fraught with less difficulty than ever before. There was, however, sufficient uncertainty as to routes between members of the park system to demonstrate clearly the necessity for the immediate designation of a park-to-park highway connecting all of the great scenic areas of the West. Great progress has been made in the past two years in the designation of this highway, but the work is not nearly completed.

The National Parks Highway Association, with headquarters in Spokane, has this year assumed the leadership in this movement, and during the spring mapped and sign-posted a route from its terminus of last year in Mount Rainier National Park to Crater Lake, thus connecting Yellowstone, Glacier, Mount Rainier, and Crater Lake National Parks by what is known as the National Parks highway. In connection with the latest link added to this important system the beautiful Columbia River highway has been marked as a side trip, and I believe that all of the parties that have traveled over the National Parks highway this year have not overlooked the opportunity to see the wonderful scenery of the Columbia River gorge. This park-to-park highway should now be extended and marked in California, Arizona, Utah, New Mexico, Colorado, and Wyoming and the circuit completed. When the work of designation has been accomplished all interested in the development of travel to the national parks can join hands in securing the improvement of the highway. In more than one sense this road will become a national asset.

In mentioning this work of designating the highways connecting the various parks, the splendid efforts and the continuous activity of the National Park-to-Park Highway Association, organized in 1916 in the Yellowstone National Park to designate and promote an interpark road system, must not be overlooked. This association,

headed by Mr. Gus Holm's, of Cody, Wyo., has already accomplished the designation of a feasible route to Yellowstone Park from Denver and has actively engaged in securing the improvement of connecting roads in the State of Wyoming. This organization is absolutely unselfish in its activities and is ready to heartily indorse any movement that has for its purpose the designation of the park-to-park highway. It stands ready to cooperate to the limit of its capacity in the advancement of any such movement.

I can not too strongly recommend that consideration be given to this highway problem by individual motorists and by the automobile associations in all sections of the Nation. It is a worthy project, and when the highway with its properly designated laterals is finally established and improved it will stand for all time as the greatest scenic highway in the world. The system would, of course, include the highways of the national parks themselves. It would also include the splendid roads of the Denver Mountain Park system, the automobile road to the top of Pikes Peak, and other scenic highways of similar distinction, in addition to the Columbia River Highway which I have just mentioned.

INTERPARK AUTO TRAVEL.

Despite the fact that the roads connecting many of the national parks were not designated as parts of a park-to-park highway system, many parties motored through several of the great playgrounds of the West. Recently I had the unusually good fortune to meet a party that had motored through nine national parks and several monuments in the course of the summer and another, an Iowa party, that had visited six national parks during a college vacation. I also chanced to meet a score of motoring parties who had toured, or were planning to tour, three or four parks. All of the interpark travelers with whom I discussed road conditions advised me that in general the roads they used were entirely safe and in a very good state of repair. Of course, hundreds of miles of the highways between the national parks of the West are paved in accordance with the latest methods of road building, but here and there are stretches of exceedingly poor roads.

PARK ROADS GENERALLY IMPROVED.

Conditions for motoring in the parks themselves during the 1917 season were most favorable. With one possible exception the park highway systems were in better condition than ever before. Every effort was made to safeguard travel on the roads. When automobile traffic was particularly heavy, extra traffic rangers were assigned to regulate the movement of cars, and all traffic on dangerous grades was carefully checked to eliminate all possibility of accident. Free automobile camp service in several of the national parks was extended during the summer, and it shall be our policy to make still further additions to and improvements in this service. These free camps are specially cleared areas provided with water, and are located at convenient distances from supplies of fuel. Where shelter for cars is needed, buildings for this purpose are erected. Toilet facilities are provided, and the installation of grates for

cooking purposes is proceeding rapidly. A photograph of a Yellowstone auto camp will be noted in this report.

The automobile guide maps, as I have already stated, were particularly useful to motor parties. The overwhelming increase each year in the number of automobiles that are entering the parks clearly signifies that by far the greatest portion of park travel will in the future be in private machines, and fixes the obligation of the Federal Government to construct new roads and continue the improvement of the highways already built, in order that the enormous volume of automobile traffic may be handled safely and expeditiously, and in a manner that will afford a maximum of enjoyment to the traveler with a minimum of inconvenience.

WHY THE MOTOR FEE IS CHARGED.

A discussion of motor traffic in the national parks invariably leads to the question of charging a fee for the admission of private cars to these reservations. These fees, which are based on the mileage of automobile roads in the various parks, vary from 50 cents in the General Grant National Park to $7.50 in the Yellowstone, where 303.55 miles of road are available for the use of the motorist. The fees, however, are regarded by many motorists as discriminatory and unjust.

The purpose of the fees is generally not understood because the average citizen is not familiar with the financial policies of Congress. Congress, while always willing to appropriate funds for the maintenance, protection, and improvement of the national parks, demands that those who use and enjoy these playgrounds shall contribute toward their administration and upkeep. The amount of this contribution is fixed, of course, by the Department of the Interior, but the funds derived by the collection of the various fees must be paid into the Treasury and an account to Congress must be rendered. Heretofore the revenues of several of the parks have been available for expenditure in these particular reservations without specific reappropriation from the Treasury by Congress annually. This policy was laid aside a few years ago and no provision for such use of revenues was contained in the organic acts of the parks recently created, and the sundry civil bill of June 12, 1917,[1] contained a clause that withdrew the general privilege of using the revenues of the older parks, except those of the Hot Springs Reservation, which is and has been for years self-supporting. This clause becomes effective July 1, 1918. It has been our policy to expend the bulk of the revenues of the parks in the improvement of roads.

The following principles have governed Congress in its consideration of the national park revenue problems:

1. The parks are far from the center of population and are not visited by the majority of the people, hence the burden of maintaining them should be shared in larger measure by the traveler in these reservations.

2. There is a relatively large volume of local travel which should bear a heavy share of maintenance costs. People who live near a park necessarily are able to make a larger use of it than those who

[1] 40 Stats., 152. See p. 1013.

come from afar. (This is a faulty principle in that it fails to recognize what the local people contribute to the construction and upkeep of State roads over which tourists going to the national parks must travel, and also fails to recognize the fact that large areas in the national park States are public lands, hence not subject to taxation, thus making the per capita burden of building and maintaining highways unusually large in States sparsely settled. Also, consideration is not given to what these people do in the way of providing free automobile camps, supplying information, etc.)

3. The tourist must pay for the use of roads and streets at home; also he must pay for service by public utilities, such as the gas company, the electric power company, the telephone company, the traction corporation, etc. There is no reason why he should not expect to help defray cost of similar service in the national parks where public utilities are very costly and expensive to maintain. Bearing these principles in mind, is there discrimination in the imposition of the automobile fee?

THE SOURCES OF NATIONAL PARKS REVENUE.

There are four sources of revenue in a national park.

1. Taxes on concessions, which may be (*a*) a fixed portion of the authorized rate for service; (*b*) a reasonable arbitrary tax based on the number of guests accommodated during the season; (*c*) a stipulated annual fee fixed after careful analyzation of the concessioners' gross revenue, operating expenses, net profits and other elements; (*d*) a percentage of the gross receipts of the season's business; or (*e*) a fair share of the net profits of an enterprise determined by deducting from gross revenues, interest on investment at a reasonable rate, depreciation charges on a fair basis, and expenses of operation. These concession taxes are being studied carefully and one of the five mentioned will shortly be adopted as a standard for use throughout the park system. (*d*) and (*e*) appear to be the most equitable methods of concession taxation.

2. Public utilities such as water systems, electric power plants, telephone service, etc.

3. Natural resources. The revenue in this case is derived from the sale of dead timber, stone, hides of predatory animals, etc.

4. Automobile and motorcycle permits.

A MATTER OF FAIRNESS ALL AROUND.

As former General Superintendent Daniels pointed out in his report of 1915, these sources of revenue are taxes in proportion to the benefit received, rather than the ability to pay. This fact is significant. The tourist who reaches a national park by train and makes a tour by an automobile transportation line pays no direct tax, but revenue accrues to the Government from the sale of his transportation ticket through one of the channels outlined in the first class of revenue sources. The cost of his ticket will, in final analysis, measure his travel contribution to the park revenues under the transportation company's contract with the department. If a party enters a park and camps in the most comfortable manner, using electric lights, taking water from the park water mains, installing a telephone in his tent, etc., he pays a reasonable rate for this service direct to the

park management, and this revenue is in proportion to the service rendered to him.

The operation of the third source of revenue is plainly similar to the public utility service.

The automobile fee covers a permit which authorizes the use of all roads safe for motor-driven vehicles. It is similar to a State license tax. If there are only a few miles of roads, such as there are in the General Grant Park, the small charge of 50 cents is made for a permit which is good for the entire season. On the other hand, in Yellowstone Park, where there are 303.55 miles of automobile highways, a charge of $7.50 is made. The Yellowstone road system is not only fifteen-fold more extensive than that of General Grant Park, but it is better improved. The benefit received in the use of the largest system is what has governed the fixing of all auto fees. Occasionally the criticism is made that a car carrying two or three individuals should not be charged the same as one carrying seven, for instance. On first consideration this seems to be a fair criticism, but when one considers the administrative difficulties involved in determining the capacity of a car, the reason for a single fee becomes evident. Also when one calculates that the party of seven will probably spend the same length of time at the hotels and camps as the party of two or three, it is reasonable to conclude that in the long run, under ordinary circumstances, the large party will contribute directly and indirectly approximately the same revenue as the smaller party will, hence the per capita revenue will be the same. Furthermore, it must be understood that a car carrying two or three individuals will cause as much wear and tear on the roads as the ordinary car of larger capacity.

The per capita revenue which is derived from visitors in the national parks really constitutes such an exceedingly small portion of the cost of the travelers' summer tours that the matter of exact equality of taxation and the amount thereof is scarcely worthy of extended consideration. The department has been very careful to keep all rates for service by concessioners fair and reasonable, and direct taxes, such as those placed on motor-driven vehicles entering the parks, are always maintained at an equitable figure.

MOTOR FEES REDUCED.

Prior to the opening of the 1917 season the old single trip automobile permit was abolished and in almost every park the season trip rate was lowered to the former single trip rate. For instance, the season permit in Yellowstone Park was $10 and the single trip permit was $7.50. The latter permit was abolished and the former reduced in cost to $7.50. The following table indicates the season permit rates of 1916 and 1917:[1]

	1916	1917		1916	1917
Yellowstone	$10.00	$7.50	Mount Rainier	$6.00	$2.50
Sequoia	3.00	2.50	Crater Lake	3.00	2.50
Yosemite	8.00	5.00	Mesa Verde	2.00	.50
General Grant	2.50	.50	Glacier	2.00	1.00

[1] No charges made for the use of roads in Casa Grande Ruin, Rocky Mountain, Wind Cave, Hot Springs, Hawaii, Lassen, Volcanic, Sullys Hill, and Platt National Parks, because of the relatively small road mileage. There are no roads in Mount McKinley National Park.

APPROPRIATIONS AND REVENUES.

It is unquestionably the policy of Congress to appropriate an amount equal to the park revenues for park purposes in addition to funds for new construction work and general maintenance of improvements. Under ordinary circumstances, the park that is well developed will yield a large revenue, but, on the other hand, a park that is not developed can not possibly yield revenue of consequence. Rocky Mountain Park, for instance, can not yield revenue because it only has two or three hotels and camps within its boundaries, has no public utilities and no automobile roads in improved condition. When appropriations are made for the general improvement of this park, revenues may reasonably be expected, but hardly before that time.

PARK REVENUES INCREASING.

The remarkable increase in national-park travel has naturally increased park revenues materially. At this date it is too early to compile the complete tables of revenues for this season, but we are already aware of the fact that the parks will yield a larger revenue this year than ever before. And the revenues will grow larger each year, even though it may appear advisable later to revise some of the fee schedules downward, thus reducing auto taxes and rates for service in the parks affected. Each year several schedules require adjustment. I believe the time will soon come when Yellowstone, Yosemite, Mount Rainier, Sequoia, and General Grant National Parks and probably one or two more members of the system will yield sufficient revenue to cover costs of administration and maintenance of improvements. An appropriation for extension of improvements and new construction work will be all that these parks will require. There probably never will be a time when all of the parks will not require appropriations over and above the revenues for one purpose or another, and it would not be proper and just to require these great national playgrounds to yield sufficient revenue to cover all the costs of operation any more than it would be fair and reasonable to expect Rock Creek Park, in Washington, to pay all costs of its operation as a public recreational area. It seems that the national parks and the Federal Government that controls them must jointly provide the necessary funds for their administration, protection, and improvement after the Federal Government has advanced their development to a point where they can yield revenue without placing a burden upon the tourist. If this should not be the policy of the future, either the Federal Government will have to support the parks entirely, which, of course, would necessarily result in a reduction in the costs of touring the parks, or the revenue fund would have to be increased to cover all costs of operation of the system. The latter course, if ever adopted, would aim a fatal blow at American tourist travel. This discussion is largely academic, however, because the middle course is plainly an accepted policy of Congress, and a change in this is not at all likely, because it is based on at least two sound business principles, as I have already explained.[1] The total revenue for the fiscal year ended June 30, 1917, was $180,571.05. The total appropriations, including deficiency

[1] See pages 803 and 804, first and third principles.

items, for the parks for the same period were $514,966.67. The tables on page 976 analyze these figures and segregate the financial statistics for each park.

APPROPRIATIONS PROVE SYMPATHY OF CONGRESS.

The appropriation for the current fiscal year for the park system is $524,780; for the monuments, $5.000. The revenues for the 1918 fiscal year already reported are $132,675.87. A comparison of the appropriations of the fiscal years 1917 and 1918[1] with those of preceding years will indicate clearly that Congress is heartily in sympathy with the development of tourist travel to the parks and is ready to cooperate by making both the parks and the monuments fully accessible. The appropriations that are now being made for many parks, however, are inadequate, and no funds whatsoever were made available for the following national parks recently established: Hawaii National Park in the Territory of Hawaii, Lassen Volcanic Park in California, Mount McKinley National Park in the Territory of Alaska. In this connection attention is invited to the statement of appropriations for national parks and national monuments on page 1005. The principal appropriations that are required now are for the extension and improvement of road systems. As I have already stated, the bulk of the tourist travel will soon be by private automobile, and we must be ready at all times to properly accommodate and protect this traffic on the highways.

THE ROCKY MOUNTAIN NATIONAL PARK.

Advancing now to a brief summary of conditions in the various national parks during the 1917 season Rocky Mountain National Park will receive first consideration. This park is selected for a place at the head of the list not because it is more important than any other member of the system nor because it possesses scenic qualities and recreational facilities superior to those of the other parks, but because it enjoyed a larger tourist patronage during the 1917 season than any other scenic national park; also because it is the most accessible national park, being only 30 hours distant from Chicago and St. Louis; also because it has not been improved under congressional appropriations since it was established in January, 1915. Its needs are worthy of special mention.

This park, which lies in the heart of the Rocky Mountains, approximately 50 miles northwest of Denver, embraced within its boundaries, as originally established, 229,062 acres of public land. The Continental Divide traverses the park in a northerly and southerly direction and the scenery in this section of the Rockies is of the very first order. The most striking scenic feature is Longs Peak, 14,255 feet in altitude. Prior to the dedication of this territory as a national park it had received no improvement in the way of road and trail construction for the accommodation of tourists. A few short wagon roads barely entered some of its eastern canyons and a few patrolling trails, scarcely fit for the use of the ordinary traveler, penetrated its mountain fastnesses. The State of Colorado had be-

[1] See recapitulation of appropriations for years 1904–1918, inclusive, on p. 978, and detailed statements beginning on p. 990.

gun reconstruction of an automobile highway across the Continental Divide by way of the Canyon of the Fall River, but only a few miles of this highway had been completed. The State promised to finish the road to Grand Lake on the west side of the park. The extensive open area lying at the base of the mountains and east of the park boundary known as Estes Park was to a large extent accessible, and there were several very good county roads entering the Estes Park region from Denver, Longmont, Loveland, Fort Collins, etc.[1] The park was reached from Loveland on the Colorado & Southern Railway, from Lyons on the Chicago, Burlington & Quincy Railroad, from Ward on the Denver, Boulder & Western Railroad, from Fort Collins on the Colorado & Southern and Union Pacific Railroads, from Longmont on the Chicago, Burlington & Quincy and the Colorado & Southern Railroads, and from Granby on the Denver and Salt Lake Railroad.[2] Automobile transportation lines connected these railroad points with the village of Estes Park, except in case of the Granby terminus where connection was made with automobile for Grand Lake.

This briefly presents the status of the park and its improvements when it was established in 1915.

AN OBSTRUCTIVE INHIBITION.

The organic act creating the park contained the following inhibition on appropriations for its protection, improvement, and maintenance:

> *Provided*, That no appropriation for the maintenance, supervision, or improvement of said park in excess of $10,000 annually shall be made unless the same shall have first been expressly authorized by law.

On account of this provision no more than $10,000 a year has been available, and as this amount has been just about sufficient to properly protect the park, it has been impossible to undertake any improvement project. The fact is, the appropriation of $10,000 is barely sufficient for protective purposes now. The act of February 14, 1917,[3] added to the park the region mentioned above as the Estes Park area, the Twin Sister Mountains, and other territory, in all 25,265 acres, thus increasing the area to be protected to 254,327 acres, and adding problems of traffic control, camp supervision, sanitation, and a multitude of other similar problems requiring an increase in the ranger force and the assumption of other financial obligations.

There was no part of the appropriation available for improvement purposes this year, and yet the obligation remained to care for all visitors to the region. Our records show that prior to October 12, 117,186 visitors entered the park boundaries, more than the combined tourist patronage of Yellowstone, Yosemite, Glacier, and Crater Lake Parks. These visitors came from all sections of the country. The large majority of them came from States east of Colorado. The hotels and camps were filled to capacity, notwithstanding the fact that 365 rooms had been added to the various hostelries and camp enterprises since the preceding year. Furthermore, the visitors

[1] See map showing position of Yellowstone, Glacier, Rocky Mountain, and Mesa Verde National Parks with principal connecting roads; p. 820.
[2] See map showing railroad routes to Rocky Mountain and Mesa Verde National Parks, p. 859.
[3] 39 Stats., 916.

who remained in the park seemed to be in no hurry to move on to other regions. Several hundred stayed all summer. The park demonstrated again that it is in the "repeater" class. Hundreds of its guests had spent one or more seasons there and, attracted by its scenery, cool, clear atmosphere, and healthful waters, returned again for rest and recreation.

AN ILLOGICAL SITUATION.

This situation is without precedent in national park history. There were thousands of people who came from distant points. They came to stay, see and enjoy this great park, and yet it was impossible for any but the most hardy to reach its most beautiful spots or catch a glimpse of its most stupendous scenic features.

Plainly the $10,000 inhibition on the appropriation should be removed. To accomplish this purpose, bills S. 1555 and H. R. 171 were introduced and are now pending in Congress. Their early enactment can not be too strongly recommended. A favorable report on S. 1555 has been made by the Public Lands Committee, and the measure is now on the Senate calendar. A bill identical to these measures passed the Senate in the Sixty-fourth Congress.[1]

In the consideration of this bill in the previous Congress, it appears that the completion of the Fall River Road by the State of Colorado was regarded as a condition precedent to the development of the park by Federal appropriations; in other words, that more than $10,000 should not be appropriated by Congress for a single fiscal year until the State of Colorado had completed this road and the Interior Department had accepted it. This association of the larger park development and the Fall River road project is not logical. The construction of the Fall River road is apparently progressing as rapidly as State funds and short working seasons will permit, and doubtless by the end of the 1918 season the two sides of the park will be connected with a very good automobile road.

On the other hand, numerous other development projects should be undertaken independently of the Fall River road construction. Several of these projects would open to the public some of the canyons, lakes, basins, and alpine meadow regions below timber line on the east side of the range. Others would involve the construction of new tourist trails into the higher mountains. Furthermore, it is most desirable to build roads to reach new camping areas, and all

[1] S. 6854, 64th Congress, by Senator Shafroth. Secretary Lane in his report on this measure said:

"Rocky Mountain National Park incloses an area of over 229,000 acres, or approximately 360 square miles, of the Rocky Mountains, lying in the north central section of Colorado. It is the scenic national park most accessible from the centers of population of the United States. It is possible to reach this park from St. Louis or Chicago in 30 hours. It contains mountain scenery of unsurpassed grandeur, and is visited yearly by approximately 50,000 tourists from all sections of the Nation. The territory embraced within the boundaries of the park is practically undeveloped. A few trails reach some of the most beautiful sections, and it is principally by trail transportation that the park is visited by the many tourists that come to its borders. This trail development, however, has not been extensive, and there are practically no roads in the park.

"Section 4 of the organic act establishing the park, which this bill is designed to repeal, specifically inhibits the appropriation of more than $10,000 for its improvement, protection, and administration. Appropriations for this park, therefore, since its creation have been small, and it has been clearly demonstrated they will little more than cover the actual cost of administering the park. The balance remaining is hardly sufficient to maintain the existing trails and telephone lines. There should be authority for making larger appropriations for this park. I therefore recommend the enactment of this legislation, because the repeal of the inhibition which it contemplates would be in the interests of reasonable and proper development of the park."

of the roads of the recently added section of the park should be improved. These projects are all necessary to make the park accessible for the throngs that are entering its gates, and not a single one of them has any relation to the Fall River road.

IMPORTANCE OF THE FALL RIVER ROAD.[1]

The importance of the road that the State is building must not, of course, be minimized. It stands as the greatest single project of the park development and when it is completed it will form the basis for all lateral road improvement on the top of the mountains. It will also afford a circle trip for motorists, making it possible to go from Denver through the park and back by way of Grand Lake, Granby, and Berthoud Pass. Moreover, it will offer an opportunity to establish transportation concessions and thus eliminate the unsatisfactory jitney business that now flourishes uncontrolled with the village of Estes Park as its base of operations.

Rocky Mountain Park is the great scenic park that is most easily reached. This year it has demonstrated that it is one of the most popular with the traveling public. What further arguments are necessary to make clear the necessity for proceeding with its improvement? Private enterprises are supplying the hotels and camps and other accommodations for tourists. Millions of dollars have already been invested in these establishments. Federal improvement of the park must come next.

THE WINTER SPORTS CARNIVAL.

The park demonstrated last winter that its accessibility in winter and its unparalleled opportunities for the enjoyment of winter sports are deserving of quite as much attention as most of its attractive summer features. A winter carnival was held in February, and over 400 people participated in the various events on the schedule of sports. Skiing, ski-jumping contests, snowshoeing, skating, and tobogganing were the most popular amusements. Conditions were most favorable for all of these sports. Moreover, the snow deposits on the mountains, the rocks, the trees, and the shrubs afforded a scenic spectacle of supreme magnificence. Winter sports in this park will be given every encouragement by the Service. Arrangements are already under way for the operation of a big snow and ice carnival during the coming winter.

Hearty cooperation between the various railroads interested in the promotion of the park and the new Rocky Mountain Parks Transportation Co., an automobile line, has resulted in the establishment of unusually attractive and diversified routes from Denver.

For instance, it has been possible during the past season to purchase tickets to Denver via any one of the important rail lines and to secure in connection therewith a ticket covering a round-trip passage via the automobile line in both directions to Rocky Mountain National Park, via train to one of the railroad termini near the park, thence via automobile to the park and return to one of these termini, or via automobile between Denver and the park in one direction and via automobile and rail in the other. Hundreds of tourists

[1] See picture of Fall River Road in this report.

ROCKY MOUNTAIN NATIONAL PARK.

FALL RIVER ROAD.

Showing turn at second switchback.

ROCKY MOUNTAIN NATIONAL PARK.

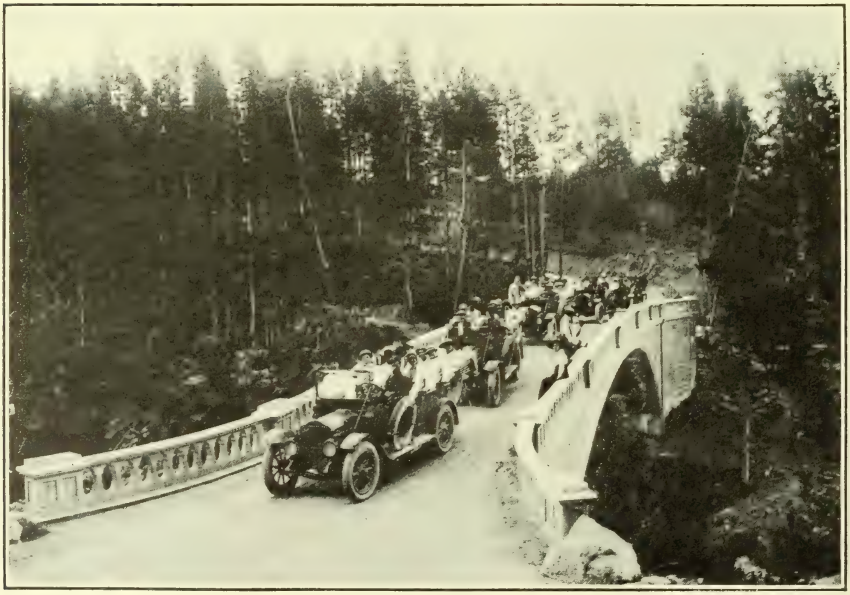
FALL RIVER ROAD.

Showing first switchback. Horseshoe Park in the background.

Photograph by J. E. Haynes.

YELLOWSTONE NATIONAL PARK.

FREE PUBLIC AUTOMOBILE CAMP IN USE DURING 1917 SEASON.



Photograph by J. E. Haynes.

YELLOWSTONE NATIONAL PARK.

NEW 10-PASSENGER CARS OF YELLOWSTONE TRANSPORTATION COMPANY ON THE CHITTENDEN BRIDGE OVER THE YELLOWSTONE RIVER.

Photograph by J. E. Haynes.

"THE GREATER YELLOWSTONE."

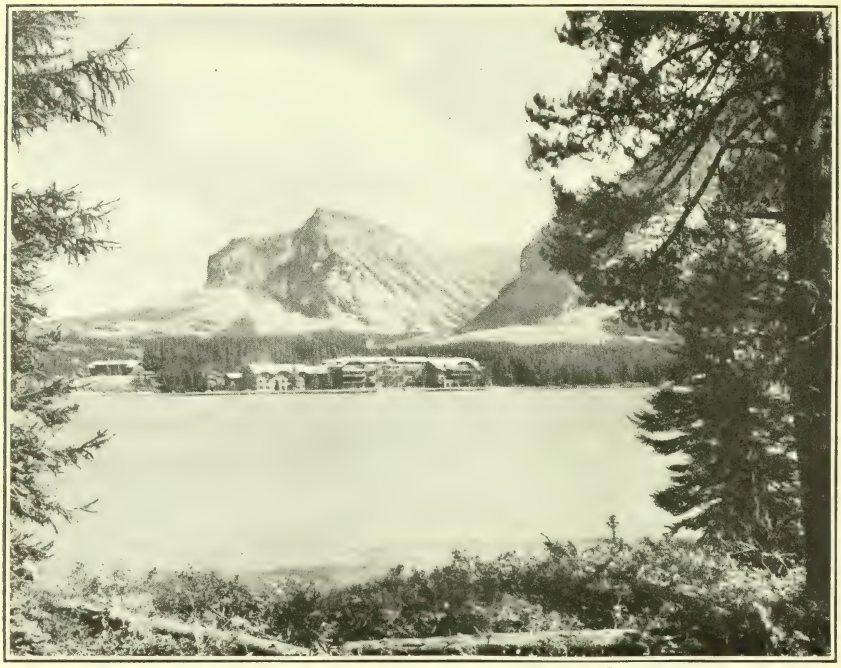
Will include part of the Jackson Hole region, geographically and scenically, a part of the mighty Yellowstone exhibit. This is a picture of Mount Moran and Jackson Lake. Mount Moran is one of the peaks of the Teton Range, which extends to the south of Yellowstone Park along Jackson Lake.

Photograph by J. E. Haynes.

YELLOWSTONE NATIONAL PARK.

FISHING AND BOATING ON LAKE YELLOWSTONE.

The National Park Service is encouraging the use of Yellowstone Park as a great all-summer resort. Fishing is excellent and facilities for boating can not be surpassed.



Photograph by Fred H. Kiser.

GLACIER NATIONAL PARK.

MANY GLACIER HOTEL ON LAKE McDERMOTT.

A large addition to this hotel was constructed during the past summer.

Photograph by Fred H. Kiser.

GLACIER NATIONAL PARK.

Party of women on tour of the park trails.

have during the season taken advantage of these exceptional opportunities to vary the course of their park trip, and the broad-gauge cooperation in the public interest that has afforded these travel facilities has, without question, had an influence in making the park so tremendously popular with the visiting public. When the Fall River road connects both sides of the park, combination rail and automobile trips into the park and over the mountains will become features of great interest to the tourist, particularly the traveler who can not remain long in the park and leisurely enjoy its marvels.

YELLOWSTONE NATIONAL PARK.

This year has been epoch making in Yellowstone National Park history. The entire concession system has been reorganized; large 10-passenger automobiles, especially adapted to the requirements of tourist travel have superseded the ancient stagecoaches; the regular park tour has been extended to include Dunraven Pass and Tower Falls, regions of splendid scenic quality; and the development of the park as a great summer resort, instead of a region to be glimpsed in four or five days of hasty travel, has been initiated. All of these projects have been revolutionary in their scope, and it is worthy of note that they were largely advanced and made effective during the tourist season without inconveniencing the public or interfering with its pleasure in any manner.

A BAD SYSTEM AND SERIOUS PROBLEM.

The reorganization of the concession system of the park was the most important accomplishment of the year. There had been numerous corporations and individuals engaged in furnishing transportation service, hotel and camp accommodations, photographic supplies, etc., and many of them had for years rendered indifferent service to the public.

There were different transportation lines operating from the northern and western entrances in the business of carrying visitors from the park terminals of the Northern Pacific and Union Pacific Railroads, respectively, through the reservation to the various hotels; there were two large camping enterprises (Wylie and Shaw & Powell companies), and one small poorly equipped camping concern engaged in the business of carrying passengers from the northern and western entrances and accommodating them in camps of a more or less permanent nature. There was an automobile concern, owned and operated by the two transportation companies and by the two large camping companies, none of which controlled the stock or the policies of the enterprise, which was engaged in the transportation of passengers from the terminus of the Chicago, Burlington & Quincy Railroad, at Cody, Wyo., through the eastern gateway to the Lake Hotel, where connection was made with the horse-drawn stage lines on the "loop" or circle route through the park. There was one hotel system involving a very large investment which embraced five hotels and two fully equipped lunch stations.

There naturally followed constant friction among so many groups of concessioners. This was particularly true of the transportation companies. Many of the concessions in the park were operated in an uneconomical manner, and the cost of this inefficiency in man-

agement was borne by the traveling public, not in the form of exorbitant charges for service, but in unsatisfactory and insufficient service.

The small camping company, after two years' operation with meager equipment and under incompetent management, had demonstrated clearly to the department and to the traveling public that it was utterly incapable of rendering permanent camp service that would even approach the standard of service established by the department. Its elimination from the park was inevitable.

Moreover, the time had come for the motorization of all transportation service in the park, and the all-important question was whether the corporations engaged solely in the transportation business and the two large camping companies should each be permitted to motorize its stage lines, or whether an adjustment of interests should be made whereby a single responsible automobile transportation line should purchase the necessary motor equipment and control all transportation service in the park. If the latter course should be chosen, large property interests necessarily would have to change hands on a fair and equitable basis. The determination of this basis involved the solution of many difficult problems. On the other hand, vast quantities of equipment, hundreds of stagecoaches, great forests of harness, scores of barns, blacksmith shops and corrals, several permanent camps and lunch stations and the Fountain Hotel would be rendered useless by the installation of motor transportation service without regard to the manner in which it should be effected.

The motorization and reorganization problems were therefore closely, yes, intimately related and were amazingly intricate.

THE PRINCIPLES OF REORGANIZATION.

The department finally concluded to grant a single transportation concession. The grounds upon which this decision was based were:

First. Because it would be uneconomical to permit the establishment of more than one transportation line on the Yellowstone roads with each touching the same point, just as it would be uneconomical to run more than one street-car line on a single street; also because each would require a separate management, a separate overhead expense account, and a separate operating supply base; likewise because there would necessarily be duplication in the establishment of garages, gasoline stations, etc.

Second. Because more than one line would be difficult to control by the park authorities, as questions of right of way on the roads would constantly arise for adjustment; and because there would be friction at railroad terminals, hotels, and other starting points in the handling of passengers.

Third. Because with more than one competing transportation system the tourist would be subjected to importunities and harassment at railroad terminals by rival solicitors, chauffeurs, and information clerks; and because the economic waste involved in the operation of the several systems would increase the cost of park tours.

Fourth. Because the investment required to establish a satisfactory transportation line in Yellowstone Park with necessary operating bases, supply stations and garages, would be very large, and it would be doubtful if more than one line could be operated at a profit.

Having determined the principles that would guide the motorization of the transportation service, reorganization of all of the important concessions was necessary before the new transportation concession could be granted. This was finally accomplished by mutual agreement between the various transportation, permanent-camp, and hotel interests. A money consideration accomplished the elimination of one transportation company and the motor line operated from Cody, Wyo. An adjustment of property interests and another cash consideration passing to a party that wished to withdraw from the camping business made possible the abandonment of the transportation features of the permanent camping business and the combination of the two important permanent camping companies. The third camping company was denied a renewal of its franchise.

When the reorganization reached the stage where there remained but one hotel company, one transportation company, and two camping companies that had disposed of their transportation privileges and combined their other property interests with the consent of the department, the policy of permitting the establishment of a single hotel enterprise, a single permanent camping business, and a single motor transportation line, as three Government-regulated public-utility monopolies, was adopted.

TOURING CARS SUPPLANT THE OLD STAGE COACH.[1]

Accordingly, the Yellowstone Park Camping Co. was organized by the former Wylie and Shaw & Powell camping interests and the permanent camping franchise was granted to it. The motor-service privilege was granted to the Yellowstone Park Transportation Co.; and the Yellowstone Park Hotel Co. was permitted to remain as the hotel concessioner. Contracts were entered into with all of these companies, and arrangements were made early in the spring for operations under the new agreements. The permanent camping company abandoned 10 of the camps and lunch stations operated by its predecessors, the Wylie and Shaw & Powell companies, built one new camp at Mammoth Hot Springs, and reconstructed the five remaining camps of the old systems; the hotel company abandoned the Fountain Hotel in Lower Geyser Basin and its two large lunch stations at Norris Basin and the West Thumb of Lake Yellowstone; the transportation company purchased 100 ten-passenger automobiles and 16 seven-passenger cars specially designed for the park service, and installed a high-class motor transportation line. The stagecoach of the Yellowstone passed into history; a new era for the park dawned with the opening of the 1917 season.

CIRCLE TOUR EXTENDED.

As I have stated, the circle tour of the park was extended this year to include the Dunraven Pass and Tower Falls regions, thus eliminating the Canyon-Norris trip and offering the visitor an opportunity to see a section of the park that contains some of the choicest bits of Yellowstone's scenery. Moreover, the schedule of the transportation line was arranged to give the visitor as much time as possible at the points of greatest interest—Mammoth Hot Springs,

[1] See picture of new cars in this report.

Upper Geyser Basin, Yellowstone Lake, and the Grand Canyon of the Yellowstone. A third advantage of the new motor system was the arrangement that the railroads and the transportation company perfected whereby it was made possible for park visitors to enter via one gateway, tour the park, and leave via another gateway. This arrangement was in effect throughout the season, and hundreds of visitors took advantage of the opportunities it offered for touring via diversified routes. For instance, 494 tourists entered via the Cody gateway and left the park via the Gardiner or northern gateway, 493 entered via the western gateway and departed in the Cody direction, 295 entered via the northern entrance and went out of the park at the western gateway.

YELLOWSTONE TO BECOME AN ALL-SUMMER RESORT.

The all-summer resort idea has not yet, of course, received much expression in actual work by concessioners, but the Service has entered upon its methodical development. For one thing, the Service, in cooperation with the Bureau of Fisheries, began the stocking of many lakes and streams not heretofore inhabited by fish; market fishing for hotels and camps in waters near these tourist centers was prohibited in order that angling might be better sport for the park visitor; new trails radiating in all directions from the hotels and camps were constructed; and other preparations and plans for the rapid development of the more general public use of Yellowstone Park were formulated.

The concessioners will now be required to encourage stop-overs in the park by offering side trips from the hotels and camps to points on the new trail system, boat trips, fishing trips, visits to interesting points, such as the Petrified Forests, the Buffalo Farm, Jackson Hole, and the Cooke City region. Mountain climbing will be encouraged, and in the near future provision will be made for the establishment of golf links and tennis courts.

Yellowstone Park has tremendous recreational advantages that are only just beginning to be appreciated. It will take time, however, to convince the general traveling public that it is worth while to spend more than five or six days in this great playground.

"CONTROL" THAT DOES NOT CONTROL.

The possibilities of the Yellowstone region are so numerous that the mere thought of them inspires enthusiasm to begin their development, but when an officer of the National Park Service stops to consider what control the Interior Department and the Service have over this vast park his enthusiasm turns to discouragement and regret. The Department of the Interior controls the concessioners and prescribes the character of service that they must render to the public. It also authorizes the rates that may be charged for service. Its officers supervise the admission of automobiles to the park and the care of the wild animals. The water system and electric light plant at Mammoth Hot Springs are under the control of this department; so is the telephone system.

But here its authority ends. All road and trail construction is under the Engineer Corps of the Army, and the protection of the park is intrusted to soldiers. The Army engineers report to the

Chief of Engineers in Washington; the commander of the patrolling troops reports through the commander of the Western Army Department to the War Department; the supervisor of the park reports to the Director of the National Park Service. The supervisor is supposed to be the executive of the park, yet he has no control over the improvement or the protection of his reservation. He understands the handling of tourist traffic, he knows the necessity for accomplishing improvement work with the needs of the traveling public constantly in mind, he is familiar with the problem of protecting the forests and wild animals of the park; nevertheless, unless the engineer officer and commanding officer of the troops voluntarily place themselves under his general jurisdiction, he can not formulate or carry out a proper administrative policy for the park, nor can he advise the National Park Service as to the manner in which the park is being operated. He can not even open the park at the beginning of the season, yet the Park Service is charged by the traveling public with every failure to make conditions for touring satisfactory. Engineer officers are changed every two or three years or more often, and the commanders of the troops and the soldiers themselves come and go under the orders of the War Department; there is no opportunity for these officers to gain a thorough knowledge of administrative methods of the National Park Service before they are moved on to other spheres of activity.

The War Department recognizes this and is especially anxious to rid itself of the duty of maintaining old Fort Yellowstone and providing for the protection of the park.

ONLY ONE WAY TO EFFICIENCY.

The National Park Service under the direction of the Secretary of the Interior is charged by the act establishing the bureau with the "supervision, management, and control" of the national parks, including Yellowstone, but this Service has no effective control of this important member of the park system, because it can not control, supervise, or manage its protection or its improvement. This, in a single sentence, describes the status of the government of the Yellowstone to-day. The park may be likened to a great three-headed monster which is difficult to manage anyway because of its great size, but uncontrollable because of the diverse activities of its three heads. Legislation designed to remedy this unfortunate and really serious situation should receive the early consideration of the National Legislature.

In all of the other national parks, with the exception of Crater Lake, where road construction is also under the Engineer Corps of the Army, full powers of "supervision, management, and control" are exercised by the Interior Department.

THE PARK TELEPHONE SYSTEM.

During the past year the Service has devoted much attention to the improvement of the telephone system. Many miles of the system have been reconstructed, and some additions to the lines have been built. This work is still in progress. It is essential that excellent telephone service be maintained at all times in order that the various

patrolling stations in the park may promptly report to headquarters all forest fires, accidents, violations of the rules and regulations, and conditions generally in the outlying sections of the park. This work of reconstruction should be continued until the entire telephone system is rebuilt. From a financial standpoint the telephone system is also entitled to consideration as an important public utility.

FIRE LANES AND SCENIC TRAILS.

The Service has also maintained several hundred miles of fire lanes and has constructed numerous additional lanes. These lanes are built on a very satisfactory grade and will splendidly serve the purposes of a tourist trail system. They lead into the great scenic sections of the park, out to lakes and streams teeming with fish, far away into the foothills of the Absoraka Range, where the herd of wild buffalo ranges, into regions of strange geological formations, and they afford park tours touching the same important points of interest that the road system includes. We may now invite the traveler to visit the Yellowstone and offer him the choice of an automobile tour of the great park or a horseback trip over the fire-lane system, where there is greater opportunity for communion with nature, its wild flowers, its trees, and its rippling streams, where wild animals, gentle and unafraid, are to be seen in abundance, and where all is fresh and calm and beautiful.

Next year, it is proposed to build a broad new trail around Lake Yellowstone, penetrating the moose country and another region of striking scenery. This trail will also make a remarkable fishing territory readily accessible.

OPENING OF THE SOUTHERN GATEWAY.

The road system of Yellowstone National Park consists of 278.8 miles of automobile highways and 24.75 miles of secondary roads. The system includes 106.5 miles of road in the forest reserves east and south of the park. Improvement of the road system was continued during the year, and hard surfacing of the main roads was begun under an initial appropriation of $20,000. The completion of the road in the Shoshone National Forest east of the park made possible the opening of the scenic Cody or eastern gateway, which the Burlington Route has developed by the establishment of through train service to Cody, connecting with the automobile transportation line to the park. The road in the Teton Forest south of the park has opened the wonderful Jackson Hole country, with its beautiful lakes and its imposing mountains of the Teton Range, great, jagged, snow-covered peaks that rise perpendicularly from the surface of the lakes in the valley. During the 1917 season, for the first time, automobiles were operated from the Lake Hotel to the Jackson Hole on a regular schedule.

With the opening of the southern gateway the park came to possess four entrances and four great feeders to the "loop" road system connecting the important points of interest. Two of these feeders in the adjacent forest reserves, as I have pointed out, are maintained as a part of the park road system on the correct principle that as they are used almost exclusively by visitors to the park their

maintenance should not be placed as a burden upon the counties in which they lie, counties that are only sparsely settled and contain little taxable property in proportion to their size.

The status of the roads in Montana leading directly to the north and west gateways is similar in many respects to those of the Wyoming feeders, and it is a question as to whether or not Federal aid should be authorized in the maintenance of these roads which are used principally by park tourists. This matter invites thorough investigation because the exceedingly heavy motor traffic on the north and west approach roads has impaired them, and is each year placing a heavier maintenance burden upon the counties in which they lie. The ability of these county organizations to bear this burden is the phase that deserves serious study.

In this connection it is proper to state that there has been at all times perfect cooperation between the State authorities of Montana and Wyoming and the National Park Service in protecting the park interests and in making conditions attractive for travel to the park. The municipalities of the two States have been active in providing free automobile camps for the use of motorists. The State game commissions of the two States have actively assisted in the protection of the wild animals of the park in the seasons when they have been driven from their natural habitats by stormy weather. The State and county highway authorities have rendered consistent aid in improving road conditions. Relations have been most harmonious.

GREATEST WILD ANIMAL SANCTUARY.

The killing of wild animals, except predatory animals when absolutely necessary, is strictly forbidden in Yellowstone Park by law. The park is therefore the greatest wild-animal sanctuary in the world. We endeavor to refrain from calling it a game sanctuary, because park animals are not game in the popular sense of the term. The park is, however, the great source of game supply for the surrounding territory, and the States of Wyoming and Montana have wisely sought to assist in the protection and control of this supply.

The State of Wyoming for many years has pursued a broad policy of game conservation, with the result that wild animals are carefully protected not only in the park region but in all sections of the State. Another result is that hunting may be permitted in proper seasons on State lands without impairing the game supply, and to the delight and satisfaction of the sportsman. On the other hand, Montana is rapidly developing a similar policy of game conservation, and the State game warden is cooperating with the National Park Service in the protection of animals in the region adjacent to the north and west boundaries of Yellowstone Park. Each State has established game refuges immediately along the borders of the park, thus increasing in an important degree the protection afforded their game. The cooperation of the two States was particularly valuable during the past winter when snows almost unprecedented in the history of the Northwest drove thousands of elk, antelope, and other animals beyond the park boundaries. Park rangers, State game wardens, and forest rangers carefully watched them through the long period of recurring storms, and every effort was made to prevent the loss of these wandering and hungry animals.

All of the animals that could not find sustenance and were accessible to the park authorities, particularly the bighorn sheep and deer and the antelope, were fed hay during the period of heavy snowfall in extremely cold weather.

EFFECTIVE WINTER CARE OF THE ELK.

There was little loss among the animals to which this special care was given. The death rate among the very old and very young animals was higher, because of loss of strength from long conflict with the elements rather than from hunger. Large quantities of hay were also fed to the accessible elk, but the elk loss was considerably larger than that sustained by the herds of other animals, because they wandered over many square miles of territory outside of the park and ranged in localities far from the roads and beaten paths. It is important, however, to observe that the percentage of loss in herds of domestic animals in the region surrounding the Yellowstone was considerably greater than the loss in the elk herds.

I have dwelt upon this care of the animals during the long, cold winter, because there was severe and unjust criticism of the National Park Service on account of losses that occurred in the elk herds. The Service, and even the department, were arraigned for the alleged neglect of their charges, and many demands were made even after the worst storms had passed that the wild animals should be fed forthwith. As a matter of fact, all of the animals that needed feed and could be reached were fed, and every other precaution to save them from death or injury was taken. Furthermore, all the hay stored in the park was used and then all supplies elsewhere available were purchased and carefully rationed out to the animals. The effectiveness of this work is best indicated by the relatively small actual losses.

There is no ground for adverse criticism, because all was done for the animals that it was humanly possible to do. In this connection, commendation is due the park ranger force for the efficient work accomplished. The members of this force braved tremendous hardships at times during the winter while engaged in watching the animal herds.

The spectacle of the wild animals in the snows of the Yellowstone in winter is one of the most interesting that one can imagine. In 1916 excursions to the park for wild animal observation were offered by the Northern Pacific Railroad, and were very well patronized. The extreme cold and fierce storms of the past winter, however, made the operation of excursions of this character inadvisable.

Many fine photographs of the animals in the Gardiner Canyon during the winter storms have appeared in various magazines during the year and have attracted much attention.

ELK DISTRIBUTED TO STATES.

In the winter it is not difficult to catch the elk. The Service accordingly makes a practice of allotting these animals to States, counties, municipalities, and other governmental organizations and public institutions for exhibition purposes where their future protection is assured. This practice has obtained for several years. During the past year 496 elk were shipped from the park. Many

more will be shipped during the winter that is approaching. Approximately 300 head have already been allotted.

BISON HERDS INCREASING.

The bison herds in the Yellowstone continue to grow apace. The tame herd now numbers 330 animals, and the herd of wild bison, the only herd of its kind in the world, numbers 67. This latter herd ranges in the east-central part of the park on the headwaters of the Lamar River and in other valleys close to the base of the Absoraka Range.

The report of the park supervisor on page 914 contains much interesting data on the wild animals of the Yellowstone.

THE EASTERN GATEWAY.

During the summer of 1916 the opening of the scenic Cody gateway of the park was the sensation of the season. The marvelous grandeur of the Shoshone Gorge, the Shoshone Dam, the second highest structure of its kind in the world, the beautiful lake that it forms, the fantastically carved canyon of the North Fork of the Shoshone, Sylvan Pass in the Absorakas, and the beautiful vistas to be obtained all the way from Sylvan Pass to Lake Yellowstone, surprised and overwhelmed the hundreds of visitors that selected this new route into the park. This route was still more popular during the 1917 season.

CLIMAX OF YELLOWSTONE SCENERY.

During the season of 1917 the scenic southern gateway was formally opened to the traveling public by the establishment of the new scheduled automobile service to the Jackson Hole from the Lake Hotel, of which mention was made in the discussion of the park road system. The scenery of this beautiful region is vastly different from that of the territory east of the park through which the Cody road runs, but it stands shoulder to shoulder with it in quality. The splendid scenery of both may only be described by profusely using superlatives. The road into Jackson Hole leaves the main road system at the West Thumb of Lake Yellowstone and proceeds in a southerly direction over the Continental Divide down through a forest of unusual density; thence along the shore of Lewis Lake, nestled in the timber and well stocked with fish; thence across the Lewis River below a point where the stream roars down a gorge forming two splendid waterfalls, the upper 80 feet and the lower 50 feet high; and thence across the Pitchstone Plateau to the southern gateway on the Snake River.

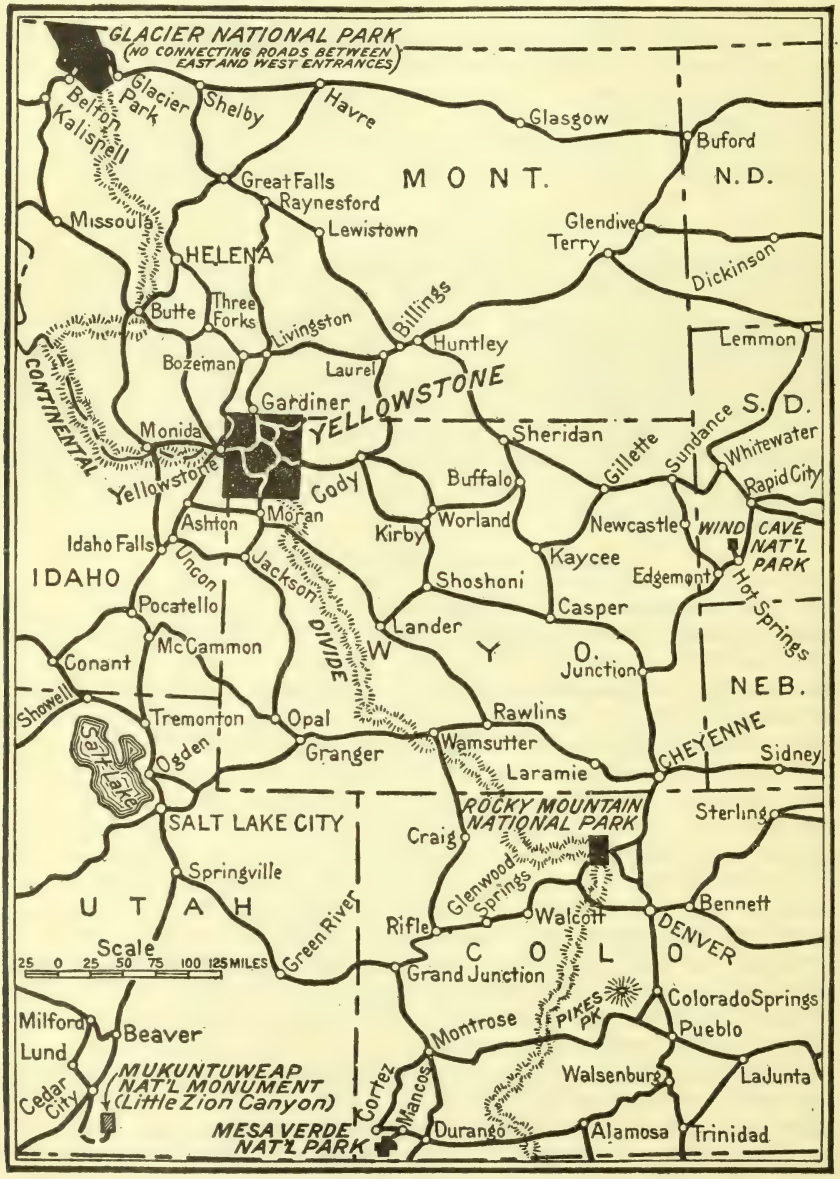
From this point the road proceeds down the picturesque valley of the Snake to beautiful Jackson Lake at the base of the Teton Mountains. A striking portion of this range, including Mount Moran and the Grand Teton, towers above the lake in astounding magnificence.[1]

All who took advantage of the opportunity to visit this region during the summer were thrilled by its splendors. One traveler of large experience made the statement that this was "the climax of Yellowstone scenery." Another said the region was "more wonder-

[1] See picture of Mt. Moran and Jackson Lake in this report.

ful than Wonderland (meaning Yellowstone) itself." All who gave the status of the region any thought declared that it should be added to the park.

This is precisely our view of the destiny of the Jackson Hole. A suggested boundary for this addition embraces the Teton Range to



MAP SHOWING THE POSITION OF YELLOWSTONE, GLACIER, ROCKY MOUNTAIN, AND MESA VERDE NATIONAL PARKS, AND MUKUNTUWEAP NATIONAL MONUMENT, WITH PRINCIPAL CONNECTING ROADS.

and including the Grand Teton and the road from Victor, on the Union Pacific system; thence it follows along the hydrographic divide

north of Buffalo River, thence to the Continental Divide, thence around the headwaters of the Yellowstone to the east boundary of the park. The area described by this line is not large, and its inclusion in the park should receive the early consideration of Congress.

The principal roads in this region are already being reconstructed and made ready for heavy automobile travel. In the meantime the Wyoming authorities are improving the highways running northwest from Rawlins and Lander and north from Granger and other points in southern Wyoming. Of the projects involving additions to national parks, this proposed Jackson Hole addition to the Yellowstone is one of the most meritorious.

THE NORTHWESTERN ROUTE TO THE YELLOWSTONE.

Another gateway that deserves more attention than has been given to it in the past is the northwestern entrance from Bozeman, Mont. The road from Bozeman leads up the Gallatin River through a splendid scenic region and connects with the main road system of the park at the western gateway. Automobile parties following this road from the west gateway or the main highway from Livingston on the north to Bozeman will find little difficulty in making an interesting trip to the Lewis and Clark Cavern National Monument, near Sappington, Mont. It is planned next season to open this cavern for the inspection of the traveling public. It is one of the most extensive caves in the United States.

REGULAR TOURIST TRAVEL SUBSTANTIALLY INCREASED.

Yellowstone Park enjoyed a heavy tourist patronage during the 1917 season, substantially exceeding that of the preceding summer. A comparison of yearly totals shows a slight advantage in favor of 1916 over 1917, which was attributable wholly to the special wild animal excursions during the early spring of 1916. These trips, as I have explained, could not be repeated in the spring of the current year because of the intense cold and unusually deep snows. The legitimate summer travel of this season, however, exceeded that of last year, and the increase in private automobile travel to the park this year is particularly gratifying. Cars to the number of 5,703 entered the various gateways of the park this season, as against 3,445 in 1916. Tables analyzing the Yellowstone travel are printed in the report of the acting supervisor of the park on page 900. The tables on page 975 show the yearly increases in the number of visiting automobiles since motor traffic was permitted in 1915; also the increase in automobile revenue which, of course, means better highways in the park.

Hundreds of motoring parties entered the park with their own equipment and supplies, and camped near the lakes and streams or in the public automobile camps which are maintained by the National Park Service. Many other parties toured the park in their private cars, stopping each night at hotels or permanent camps.

FREE AUTOMOBILE CAMPS ESTABLISHED.[1]

The free public automobile camps are located at Mammoth Hot Springs, Upper Geyser Basin, Yellowstone Lake, and the Grand

[1] See picture of automobile camp in this report.

Canyon. In each of these camps there is a spacious structure for the shelter of cars, plenty of water for drinking and cooking purposes, grates to be used for cooking, and toilet facilities. The camps are policed by park employees and a small truck is used for carrying away garbage and keeping the camping grounds strictly sanitary. This system of free automobile camps will be extended in the park as the demand for them increases. The continued improvement of roads leading to Yellowstone Park from eastern points and the complete establishment of the park-to-park highway will tremendously encourage the automobile travel in the park.

YELLOWSTONE RAILROAD ROUTES.

Railroad traffic to the park this year was somewhat less than that reported last year, but was nevertheless gratifying. Three railroads reach Yellowstone. The terminus of the Northern Pacific is at Gardiner, Mont., which is reached by travel over the main line of the Northern Pacific to Livingston, Mont., thence up the scenic canyon of the lower Yellowstone River to the park boundary. The ride from Gardiner, the northern gateway, to Mammoth Hot Springs through the Gardiner Canyon is also very interesting. The famed Eagle Nest Rock is in the Gardiner Canyon and a herd of park antelope usually range on the meadow between the mouth of the canyon and the north boundary. It is in this region that the wild animals gather in the winter time. The Northern Pacific line to the park was the first to be established.

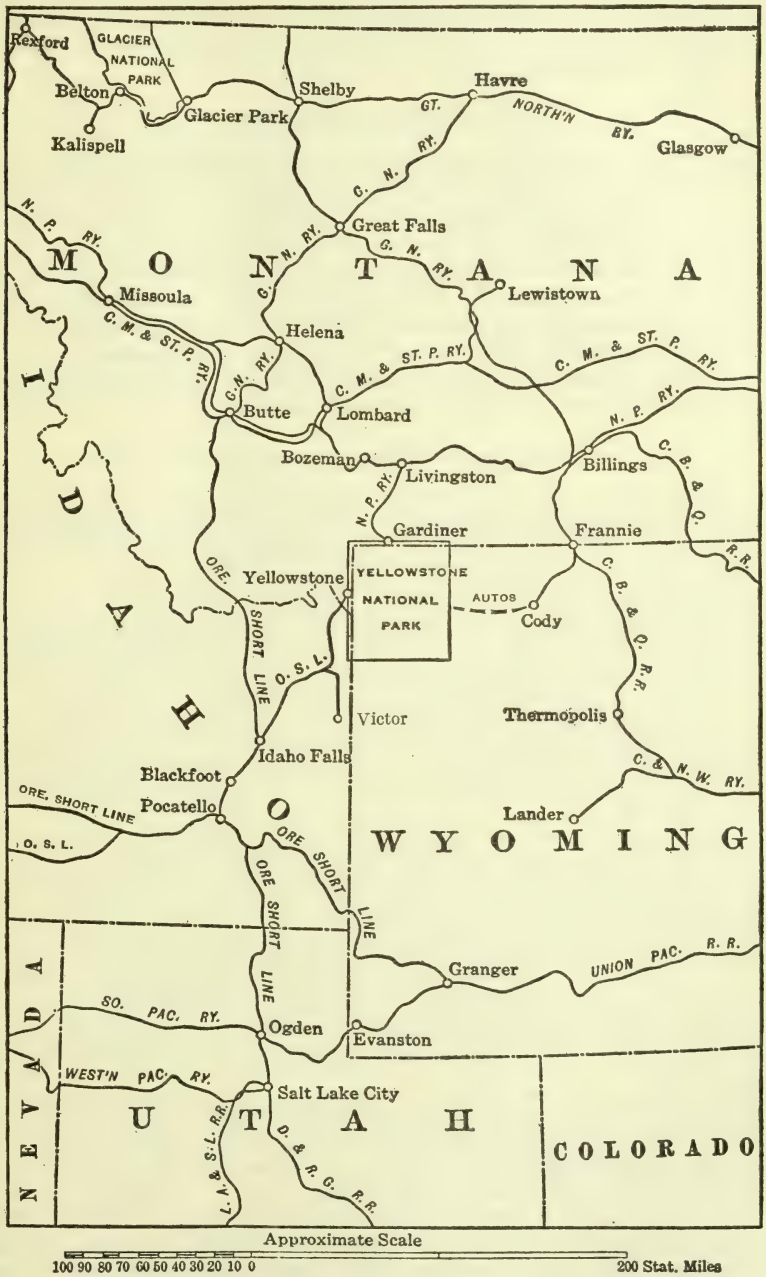
The second oldest line is the Union Pacific branch line to the western gateway at Yellowstone, Mont. Trains from the east connect with this line at Ogden, Utah, but usually the traveling public prefers to visit both Ogden and Salt Lake City in connection with the Yellowstone trip. The line to the western gateway is also scenic, particularly the Reas Pass section of the route where the railroad crosses the Continental Divide. The ride from Yellowstone, Mont., up the Madison River to the junction of the Gibbon and the Firehole Rivers, which form the Madison, is most attractive. At this point the western gateway road connects with the main road system.

It is also worthy of note that in connection with the park trip through the western gateway connection may be had at Salt Lake City with the Salt Lake Route for Lund, Utah, at which place an automobile line is prepared to carry passengers into the beautiful Zion Canyon, Mukuntuweap National Monument. Connection may also be made at Salt Lake City and Ogden with the Denver & Rio Grande lines for Mesa Verde National Park, the Royal Gorge, etc.; also with the Southern Pacific and Western Pacific lines for California and with the Oregon Short Line subsidiary of the Union Pacific for the Northwest.

The third railroad route to Yellowstone National Park is the Burlington Route, with terminus at Cody, Wyo. From Cody the scenic trip to Yellowstone Park is made as described elsewhere in this report.[1] Cody may be reached from two directions, via the Burlington route. One line, from the southeast, passes through Edgemont, S. Dak., where connection may be made for Hot Springs, S.

[1] Page 819.

Dak., and Wind Cave National Park, thence through Sheridan, Wyo., near the Devils Tower National Monument and the Big Horn Moun-



MAP SHOWING RAILROAD ROUTES TO YELLOWSTONE AND GLACIER NATIONAL PARKS.

tains, thence through Billings, Mont., to Cody. The other line runs north from Denver and Cheyenne to Caspar, thence down the bril-

liantly colored and fantastically carved Wind River gorge through Thermopolis, where there are hot springs possessing recognized curative properties and a State zoological park, and on to Cody. The two Burlington lines join at Frannie, Wyo., in the Shoshone reclamation project, one of the largest and most successful of the Government reclamation enterprises.

REAL RAILROAD COOPERATION.

These three railroads interested in promoting Yellowstone travel have authorized the sale, during the park season, of round-trip excursion tickets covering railroad transportation to the park via the lines of any one of these roads and return via the same route or via the lines of one of the other two routes. Thus during the 1917 season, as I stated on page 814 in connection with the motorization of intrapark transportation, visitors to Yellowstone Park for the first time had the privilege of entering the park at one entrance and leaving it at any one of the other gateways, except, of course, the southern gateway, which has not as yet been developed as a railroad entrance.

GLACIER NATIONAL PARK.

The outstanding features of the Glacier National Park season are:

First, the vast improvement in the road and trail system that has been effected under congressional appropriations.

Second, the increase in tourist patronage.

Third, the growth in popularity of the park as a summer resort, as evidenced by the return for another season of a large number of visitors of previous years and a substantial increase in the average length of time spent in the park by its visitors.

The appropriations for the 1917 fiscal year and for the current year for Glacier National Park have been sufficiently large to make it possible for us to accomplish much in the way of improvement work in all directions.

The road system on the east side of the park, which connects the various hotels and chalets of the Glacier Park Hotel Co. with the Great Northern Railway at Glacier Park station, as originally constructed, has been in very poor condition, and prior to the 1917 season this side of the park was rarely opened for tourist travel at the beginning of the season, because it was impossible to place the roads in condition for automobile traffic. Each year improvement was made, but there never were sufficient funds available in any one year to carry the work forward far enough to make travel conditions satisfactory.

The appropriation available for the last fiscal year was $110,000, for the current fiscal year, $115,000. With these funds it has been possible to improve the road systems on both sides of the park. The system on the east side has been largely rebuilt. The crossings of the river bottoms and lowlands have been filled to a sufficient depth to lift the road out of the mud and water in stormy weather. Bridges and culverts have been constructed, curves have been eliminated, grades realigned, and many miles of the system have received a graveled surface.

This improvement work has made tourist travel by the regular transportation line safe and, from the visitor's point of view, comfortable and delightful. On the other hand, conditions for private motor travel have been better than ever before.

ROAD IMPROVEMENT AND RECONSTRUCTION.

No new road construction was undertaken during the season. Extension of the road system, however, is now desirable, and when one takes into consideration the increase in tourist travel in the park he finds it absolutely necessary. As Director Mather pointed out in his "Progress in the Development of National Parks," issued a year ago, road extension in Glacier Park should proceed in two important directions. From Lake McDonald on the west side of the park one road should be constructed in a northerly direction up the McDonald River Valley through the Granite Park region and over Flattop to Waterton Lake. The other road should be constructed across the Continental Divide, thence through one of the beautifully glaciated canyons, to make a connection with the main east-side system.

IMPORTANCE OF A ROAD ACROSS THE CONTINENTAL DIVIDE.

Of these two road projects the latter is, of course, the more important, because it would join the highway systems of the two sides of the park, thus making it possible for motorists to reach the beautiful regions of the higher mountains, and to afford them a crossing of the range without the difficulties and expense of shipping their cars between Belton and Glacier Park stations on the railroad or accepting the alternative course of driving several hundred miles southward to the nearest automobile road over the Rockies.[1] This addition to the Glacier Park system would also form a very important link in the park-to-park highway system. It is very discouraging to motorists who visit Glacier Park with the intention of seeing both sides of its extraordinary mountains to find, when they arrive at one or the other gateways, that there is no road over the mountains and that they either will have to ship their cars from one side to the other or make a detour of several hundred miles in order to reach the road system of the opposite side. It is also discouraging to elderly people and the class that can not endure long walks or rides to reach the park and find that they really can not move a very great distance from the hotels reached by the automobile.

An estimate for the appropriation of sufficient funds to survey a feasible highway route through one of the passes of the park and to cover all expenses incidental to the preparation of all plans for this road project will be submitted to Congress for its consideration in the next session. When a feasible route across the mountains has been determined and the project completely planned, the department will be in a position to advise Congress as to the cost of this trans-mountain road.

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[1] See map showing position of Yellowstone, Glacier, Rocky Mountain, and Mesa Verde National Parks and Mukuntuweap National Monument with principal connecting roads, p. 820.

LAKE M'DONALD ROAD A PRIME NECESSITY.

Prior to the construction of the road over the mountains or the road through the park to Waterton Lake, it will be necessary to complete a road along the shore of Lake McDonald to the Glacier Hotel at the head of the lake. This is an important link in both of the big road projects. Among other convincing reasons, it is necessary that this road should be built as soon as possible in order that motorists visiting the west side of the park may reach the Glacier Hotel and avail themselves of the accommodations of this excellent resort. At the present time it is impossible to go within 9 miles of this hotel, and all visitors to the park find it necessary to leave their cars at the foot of the lake and then take the boat across the lake to their destination. It would be impossible to overestimate the importance of this proposed Lake McDonald road.

Another road project, very important but smaller than those just discussed, contemplates the continuation of the Cutbank road several miles up the beautiful Cutbank Valley to a point where a new chalet will be built.

MANY NEW TRAILS.

The extensive trail system has also been improved and several miles of new trails have been constructed. The important new trail connecting Glacier Hotel on Lake McDonald with Granite Park Chalet was completed during the season. The construction of a new trail connecting Granite Park Chalet with Sun Camp, via Logan Pass, and a connecting trail to the Glacier Hotel, was begun and will be finished next summer. Several other important new trails will be completed this autumn.

Many new foot trails leading from the various hotels and chalets to scenic points in their immediate vicinity were built and made available for use this year. The most important of these trails lead from the Granite Park Chalet to points where thrilling vistas of the finest mountain scenery may be obtained. One of them proceeds for a considerable distance ($2\frac{1}{2}$ miles to Gould Mountain) along the Garden Wall on the very crest of the Continental Divide and from it one may step directly onto the Grinnell Glacier, one of the safest and most interesting glaciers of the park. It is proposed to continue this trail along the Garden Wall for several miles. Another new trail gives access to Swiftcurrent Mountain from whose summit, after a brief and easy climb of less than an hour, one may view the whole of Glacier National Park and portions of the Canadian Rockies on the north, the Blackfeet Indian Reservation on the east, and the American Rockies outside the park limits on the south and west.

Serious forest fires which threatened to destroy large areas of timber on the west side of the park necessitated the rapid construction of many miles of new fire lanes and secondary trails during the summer. The construction of these trails made it possible to rapidly move fire-fighting crews, equipment for combating the fires, and miscellaneous supplies for use in this work. These trails will hereafter be kept in repair as part of the general trail system. Some of them reach scenic regions which heretofore have been almost inaccessible, and these later will be improved and made a part of the general tourist trail system.

VISITORS GROW IN NUMBER AND STAY LONGER.

The increase in tourist travel to Glacier Park during the past season was notable. Our records show that 15,050 visitors visited the park prior to October 12, as against 12,839 in 1916. There was an increase in travel by rail as well as by private machine. I may go still further and say that of those who came to the park by both rail and automobile there was a larger percentage who availed themselves of the privileges of walking and riding over the trails than there was in previous years. Walking on the trails was particularly alluring this summer because of the weather conditions. The trails were in a better state of repair than ever before; there was little rain during the season. On the other hand, tourists availed themselves of the improved conditions for horseback riding and there appears to have been more general use of horses than during any other season in the history of the park.[1]

During the past year the saddle-horse concession has been reorganized and developed under a new franchise from the department. Much new equipment and many additional saddle horses have increased the capacity of the trail transportation company to meet the demands of the increasing throngs of visitors.

During the past two or three years it has been evident that the visitors to Glacier National Park have not been in a hurry to leave this beautiful region. Parties that had come to spend a few days remained for weeks, and those who had arranged for a few weeks in the park have let their visits extend into months. This year the average length of time spent in the park by visitors has been longer than the average of any previous year. Visitors made a practice of going from one hotel to another on one side of the park, then crossing over the mountains on the railroad or on the trails and visiting the resorts of the opposite side; often they have moved back and forth across the mountains several times in the course of their sojourn in the park.

Chalets in the higher mountains have been more popular than ever with this class of visitors during the past season. This is particularly true of the Granite Park Chalet, located just west of Swiftcurrent Pass, in a region where all of the highest and noblest peaks of the park may be seen in one glorious panoramic view. I saw Granite Park this summer when its whole surrounding region was spattered with snowfields. The scenic spectacle was as fine as anything I had ever witnessed in the mountains, and the development of the trails, as already described, has begun to open up the charms of the region. The Granite Park chalets are connected by trail with the Glacier Hotel, on Lake McDonald, and with the Many Glacier Hotel, on Lake McDermott. When the new Logan Pass trail is completed there will be direct connection between Going-to-the-Sun Camp and Granite Park.

GLACIER AN EXAMPLE FOR YELLOWSTONE.

Popularity of the character which Glacier Park now enjoys is precisely the sort of thing that we want to obtain for Yellowstone and other parks. We want the traveler to come into all of our great

[1] Note picture in this report.

playgrounds with the idea of staying as long as possible and exploring all their beauty spots. And we want him to come back again and again to these playgrounds and get new pleasures and renew the delightful thrills of former trips; thus will he upbuild his strength and health for the months when he can not heed the call of the mountains.

Glacier and Rocky Mountain National Parks now have a large number of faithful friends that return to them in summer just as regularly as vacation time comes around. Yosemite Valley, the Giant Forest in Sequoia National Park, Paradise Valley in Mount Rainier, and particular localities of other national parks enjoy a similar popularity, but in a smaller degree. We are doing all that we can to encourage the visitors to these other parks to explore those vast areas of mountains, canyons, forests, and streams which are as yet little known and go back to them again and again.

NATIONAL PARKS ARE NATURE'S OWN SCHOOLS.

Glacier Park has long been a favorite park for exploration by students of various sciences in the colleges of the country. The classes in geology from one large Middle West university make a practice of visiting Glacier Park each year. During the summer of 1917 these classes were in the park as usual.

It is our hope to encourage the general use of all of the parks as great fields for scientific study. Parks like Glacier, Yellowstone, Mount Rainier, Yosemite, and Sequoia afford unparalled opportunities for the study of the natural sciences—geology, physiography, botany, forestry, and all the rest, and nowhere can the study of archæology and anthropology be pursued with greater interest and satisfaction than in parks like Mesa Verde and Casa Grande, and in monuments such as Montezuma Castle, Chaco Canyon, Navajo, Tonto, and Bandelier.

CONVENIENT FOR STUDY OF INDIAN LIFE.

Another feature of Glacier National Park that is most interesting to its visitors is the Indian life to be observed along its eastern border. The Blackfeet Indians, one of the sturdiest and most vigorous of all the tribes of the Northwest, live on their reservation just east of the park, and side trips from several of the hotels will bring one into the very center of the Blackfeet settlement. Occasionally small bands of Indians cross the park borders, taking with them their picturesque tepees and establishing camp as their old men and forefathers did in the days when all of the park east of the Continental Divide was part of their reservation.

In this connection it is interesting to consider the opportunities for observing the life of the various tribes of Indians on their reservations while touring the national park system. The Crow and Wind River Reservations are not far from the Yellowstone; the Blackfeet Reservation adjoins Glacier Park; the Yakima Reservation is near Mount Rainier Park; adjacent to Crater Lake Park is the big Klamath Reservation. The Digger and other Indians may be seen in the Yosemite Park. A trip to the Mesa Verde takes one through the Southern Ute and Jicarilla Apache Reservations, and not far to the

Southwest lies the country of the Moquis and Navajos. It is a most interesting thing to study the life and growing civilization of the Indians tribes as one travels from park to park.

ROCKY MOUNTAIN GOATS AND OTHERS.

The Blackfeet Indians near Glacier Park, however interesting they may be in the summertime, make administration of the east side of the park difficult at other times of the year. These Indians insist that their treaty rights entitle them to kill the park animals when they wander over the east park boundary, driven by the storms originating in the high mountains. And each year they do kill large numbers of bighorn sheep, Rocky Mountain goats, elk, and deer. The Office of Indian Affairs and the National Park Service are cooperating to discourage this unlawful slaughter of the park animals. It is hoped that the practice will soon be stopped entirely.

The wild animals of the park are annually increasing in numbers and are becoming tame. It is a rare occasion when a visitor to the park does not see two or three different species of wild animals on a trail trip. The picturesque Rocky Mountain goat is the animal that attracts more interest and furnishes more delight than most of the other animals, and "Rocky M. Goat," as Mr. Yard in his book "The top of the Continent" calls him, is becoming each year less afraid of the tourist and hence more frequently visible along the trails and footpaths.

BOATING AND FISHING.

Boating has always been an important source of pleasure to the visitor to Glacier Park. Boats have been operated on Lakes McDonald, two Medicine, St. Mary, and McDermott for several years. This year the sport of boating on Lake McDermott became so popular that we have arranged to make Lake Josephine accessible from McDermott, and next year boating enthusiasts in the Many Glacier region will find their pleasure waters more than doubled in area.

Fishing in the park was better than ever during the 1917 season. Lakes that were stocked several years ago are now furnishing exciting sport for the angler. Glacier Park is peculiarly fitted by nature to be a great trouting resort, and the Service is now considering plans, in cooperation with the United States Bureau of Fisheries, for a trout hatchery within the park. If these plans are consummated large quantities of trout will be distributed to all of the accessible lakes of the park, and there will be no difficulty in keeping them stocked hereafter.

Other improvements in the park during the year include the construction of a large addition to the Many Glacier Hotel on Lake McDermott and the erection of additional accommodations at the Glacier Hotel on Lake McDonald. The improvement of the saddle-horse service under a new concession from the department by the purchase of many new horses and the addition of much new equipment was an important forward step. The new saddle-horse concession was granted under a contract which provides for compensation to the Government on a profit-sharing basis. Twenty-five per cent of the net profits accrue to the Government during the first three years of the period of the contract and 50 per cent thereafter.

PROPOSED DEVELOPMENT AT BELTON.

During the year a tract of 160 acres of patented land on the north bank of the Flathead River, directly opposite the railroad station of Belton at the western gateway, was purchased and donated to the Government for use as an administrative site. This tract was the gift of Director Mather. A new and attractive administrative village will be constructed on this site, and ultimately it is hoped that a bridge of dignified proportions and in complete harmony with the environment of the region may be constructed across the river at this point. Proper administration buildings for Glacier National Park are desperately needed. At the present time the supervisor's office is located in the woods on the west shore of Lake McDonald; it is almost inaccessible to the traveling public and very difficult to find unless the seeker for information is conducted to the administration cabin by some party who is well acquainted with the park. The reason why the quarters were established at this undesirable place was due solely to the fact that all of the land between the Flathead River and the foot of Lake McDonald is held in private ownership; even the Government road through the beautiful forest connecting Belton and the foot of the lake traverses private holdings.

This strip of road, while short, is one of the most scenic highways in the national park system on account of the forest growth through which it runs. Efforts are now being made to effect an exchange of timber under the authority of a recent act of Congress which provides that lands along roads in this particular section of the park may be exchanged for timber or timber and lands of approximately equal value in other portions of the park or in the national forests of Montana. The text of this act will be found on page 1011. If a satisfactory exchange can be effected the scenic character of the Belton-Lake McDonald road will be forever preserved.

RAILROAD FACILITIES.[1]

Glacier National Park is reached by the Great Northern Railway. In fact, the main line of this railroad forms a portion of the south boundary of the park. Two first-class trains are operated on a fast schedule from the east and west each day. The Burlington Route also operates a first-class train daily from the east and south over its own lines to Billings, Mont., thence over the Great Northern Railway to the park on to Puget Sound.

There is much travel between Glacier and Yellowstone National Parks but the schedules of trains operating between the two parks do not afford opportunities for a very comfortable trip in either direction. It is particularly inconvenient to go between the two parks by way of Helena, as it is necessary to arise at 3 o'clock in the morning to board the Helena train at Livingston. Of course, the sleeper may be taken to Butte, where connections may be made for a train to Helena, but if one wishes to go on to Glacier Park the same day, or to Yellowstone if he is coming from the other direction, he will have no opportunity to stop in Montana's capital for longer than a few minutes. The route via Billings is more convenient. It is to be hoped that the tourist traffic between the two parks will soon be

[1] See map showing railroad routes to Yellowstone and Glacier National Parks, p. 823.

such as to justify the establishment of a through service connecting the two parks, either by way of Billings or via Helena and ultimately by way of both cities.

MOUNT RAINIER NATIONAL PARK.

It is difficult to imagine a splendid new hotel with every modern convenience, located in one of the most beautiful spots in the world and filled to capacity with guests, and yet completely surrounded by snow from 4 to 10 feet deep. It is more difficult to conceive of such a picture upon July 15. One naturally thinks that the date, at least, must be mistaken. Nevertheless, the hotel I have in mind, a beautiful new structure erected last autumn in Paradise Valley, Mount Rainier National Park, was opened for the season and thronged with visitors long before July 15, with snow heaped from 6 to 14 feet deep around it. On July 15 I saw this hotel surrounded by snow which then had an average depth of 4 feet.

Why was the hotel opened? What was there for its guests to do in this snow-bound place?

WINTER SPORTS IN SUMMER.

My answer is that they were engaging in winter sports. The management of the new hotel provided large quantities of skis, snowshoes, toboggans, and specially-made sliding trousers for men, women, and children, and all went out into the snowdrifts for the best fun and most thrilling experiences that one could enjoy anywhere at any time of the year. Experienced guides were employed to teach the various sports and the use of the winter equipment necessary. Everyone, young and old alike, went out into the snow and played until sheer fatigue drove them into the hotel lobby, where a cheerful fire was always burning in the great fireplace. The young people even tobogganed and skied for hours by moonlight. It was delightful to hear their happy cheers as they sped down the mountain sides.

Visitors to Paradise Inn, while the road to the hotel was closed by snow, reached the hotel by sleighs, snowshoes, or on horses made available at Narada Falls by the hotel concessioner. Strong waterproof boots for men and women were also available for those who cared to walk to the hotel over the snow. Parking space for machines was provided at Narada Falls, and rangers were placed at this point to regulate the traffic and protect the cars. The snow spectacle en route to the hotel was beyond description. I am sure that those who enjoyed Paradise Valley under these unusual circumstances will never forget their experiences.

"Winter sports in the summer time"[1] will continue to be a feature of the Mount Rainier National Park season. The hotel will always be opened before the snow melts, and appropriate announcement of the sports that may be enjoyed on the mountain will be made from time to time by the hotel management and also by the National Park Service.

It is proper to mention here that the Mountaineers, the great outdoor organization of the Northwest, snowshoed to Paradise Valley

[1] See picture in this report, "The Human Toboggan."

last New Year's Day and enjoyed winter sports in the winter time. The new hotel was opened for them, and the hardy members of this club found conditions as favorable for their sports at that time as the summer visitors found them in July. Opportunities for enjoying snow sports during the winter months are unlimited, but, of course, they should be promoted in the lower levels of the park rather than in the higher valleys.

REAL ACCOMMODATIONS AT LAST.

Striking improvements in Mount Rainier Park are in evidence all around the mountain. First in importance is the fine new hotel in Paradise Valley.[1] Next may be mentioned the picturesque new camp at the snout of the Nisqually Glacier. A new hotel has been built on the patented land at Longmire Springs, and this alienated tract has been cleaned up and improved in a manner that makes it impossible to recognize the old Longmire property. This hotel does not have as many facilities for accommodating guests as the National Park Inn across the road on Government land possesses, but it is a comfortable hostelry and I understand that it has been well patronized.

The Longmire Springs property should be owned and controlled by the Government. While there are other tracts of park lands in private ownership, the Longmire property is the only one that is absolutely needed for park purposes.

The National Park Inn has been operated under the management of former years and the service to guests at this resort this year has been up to the high standard of former seasons. This hotel is fully equipped with an electric-light plant, a refrigeration plant, clubhouse, etc.

The National Park Service has concentrated its improvement work entirely upon the road and trail system during the past year. Under an appropriation of $75,000, the largest ever made by Congress for this park, the entire road system, including the Storbo road, has been improved. The road from the southwestern gateway to Nisqually Glacier has been widened, graded, and surfaced, several new bridges have been constructed, and new culverts installed. The road beyond the glacier to Narada Falls and Paradise Valley has been somewhat widened, curves have been eliminated, parapets have been constructed, and the road throughout its length graveled and made entirely safe for automobile traffic. A large parking space has been cleared at Narada Falls for use when the continuation of the road to Paradise Valley is blocked with snow. In fact, the road above the glacier has been so much improved that the rule prohibiting the driving of cars above Nisqually Glacier by women and boys under 21 will be abrogated next season.

The trail system around the mountain has been much improved during the year. Miscellaneous construction work, including the erection of a residence for the supervisor at the southwestern or Nisqually River gateway, was accomplished.

THE CARBON RIVER ROAD.

In 1915 a survey for a road up the Carbon River Valley was completed and in 1916 a survey of the road through the southeastern

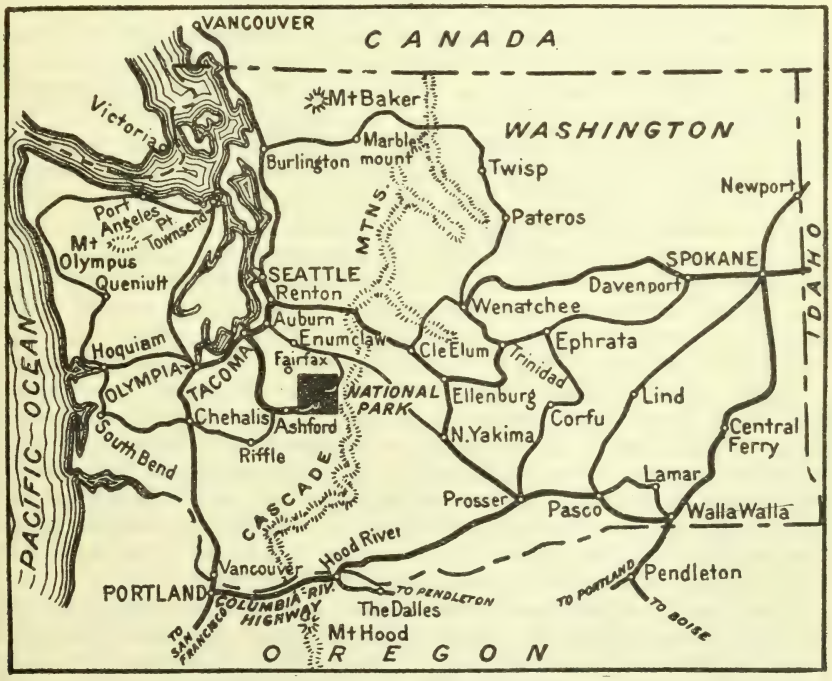
[1] See picture of new Paradise Inn in this report.

section of the park to Cayuse Pass was finished. This year a survey has been conducted to determine a feasible route for a road between the Carbon River and the road system in the southwestern part of the park by way of the west side of the mountain. This survey has not yet been completed.

Appropriations for the construction of the Carbon River road have not yet been made by Congress, but the project is receiving the serious consideration of the appropriation committees. It will be recalled that it was proposed to construct this road from the end of the Northern Pacific Railroad above Fairfax, Wash., to the snout of the Carbon Glacier. When completed, it will open a region of marvelous beauty. The forest growth will be one of the most attractive features of the new highway.

A PUBLIC MISFORTUNE.

Visitors to the Carbon River section in the past will regret to learn that the magnificent forest just outside of the park in the Fairfax direction has been entirely cut over during the past year. Not even the strip along the surveyed right of way for the Carbon road was left to preserve intact the sylvan beauty of the projected highway. Where an almost impenetrable forest stood there is now nothing but broken branches, tree tops, and stumps.



PRINCIPAL AUTOMOBILE ROADS IN WASHINGTON.

The havoc wrought in this beautiful forest raises again very vividly the question as to how the magnificent trees along the road between Tacoma and the park may be preserved. The beautiful

forest growth along this road is famed throughout the world and yet it stands every moment in danger of destruction. The owners of the trees can not be expected to allow them to stand forever and forever. They are very valuable in these days when there is such a demand for timber, and not even donations of strips of this timber growth to the Government can be expected. The public-spirited owners of the property are loath to cut the trees, but, unless arrangements are made for their preservation by purchase and donation to the Government or to the State, the timber will have to go. Therefore, there is time to save the trees, and all lovers of Mount Rainier and the beautiful road connecting it with Puget Sound should get together and see what can be done to meet the exigencies of the situation.

Mount Rainier National Park has long been known as the wild flower park, and this year the wild flowers appeared to grow in a greater abundance even than in past seasons. It was wonderful to see the luxuriant growth in little spots on the mountain where the snow had melted early but which were still surrounded by snowdrifts. In one small spot, approximately 10 square feet in area, I counted eight different species of wild flowers. A canyon a few yards from this spot contained a snow bank approximately 100 feet deep.

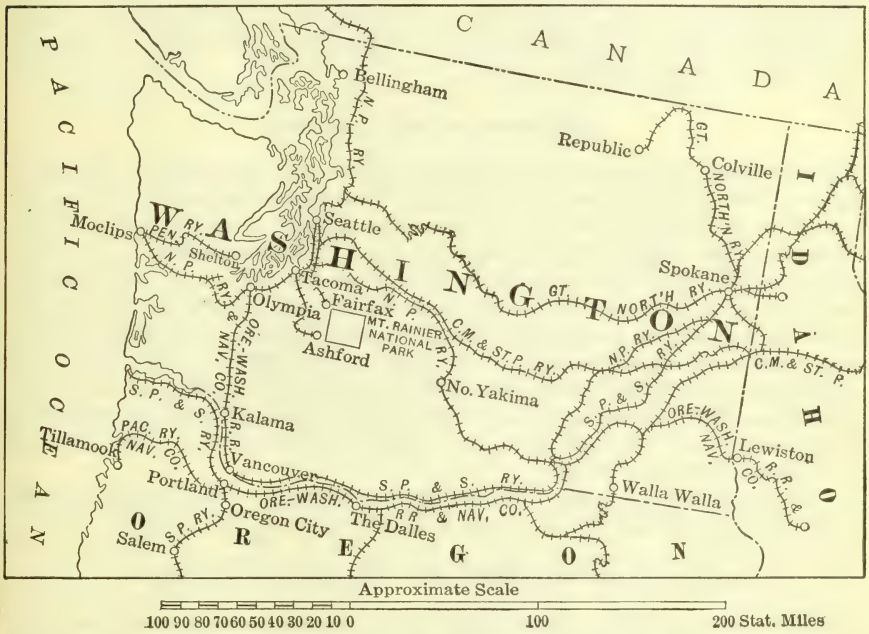
WANTED: BETTER GAME PROTECTION.

The animals of the park are increasing but rather slowly, because when they drift down from the higher altitudes in the autumn and wander outside of the park, as they are bound to do, they are killed in large numbers by the waiting huntsmen. A refuge for these wild animals should be established around the park in order that fall and winter grazing areas may be provided for them. Sanctuaries of this kind would give the animals the desired measure of safety, would make propagation conditions better, and would effect the very desirable result of making the animals less afraid of man. These wild-animal refuges should not be so large that all hunting in the vicinity of the park is completely cut off. They should be reasonable in extent. Their establishment would improve the game supply and make hunting within a few years better than it is to-day.

A few small additions to Mount Rainier National Park are also desirable. A small strip should be added to the southern part of the park. This should be sufficiently wide to include the part of the park road system that now lies in the adjacent forest and also the Ohanapecosh Hot Springs which are only accessible from the park trail system. It would also be desirable to add a reasonable area to the west side of the park in order that the forest growth and the wild animals in this region may be better protected.

The travel to the park during the year has exceeded all past records. Its tremendous increase was largely accounted for by the great influence of the motorist. The number of automobiles entering the park this year were 5,894, against 3,070 last year. The total tourist travel was 35,568, against 23,989 last year. Conditions for motoring in the park are better now than ever before, and we have every reason to expect that automobile traffic will continue to increase by leaps and bounds.

The railroads which reach the points nearest the park boundaries are the Chicago, Milwaukee & St. Paul, with terminus at Ashford, Wash., and the Northern Pacific, with terminus at Fairfax, near the northwestern corner of the park. Until the Carbon River road is built tourist travel via the Northern Pacific to Fairfax will be of little importance. As the Rainier National Park Co. operates an automobile line from Tacoma and Seattle to the park on daily schedule, the park is as readily accessible by this route as it is by the railroad lines. As I have indicated in another part of this report, Mount Rainier Park is on the National Parks Highway.



RAILROAD ROUTES TO MOUNT RAINIER NATIONAL PARK.

VIA COLUMBIA RIVER HIGHWAY.

In going from Mount Rainier Park to Crater Lake, either by automobile or train, the national park traveler should go through Portland, Oreg., and make the trip over the wonderful Columbia River Highway and enjoy the scenic grandeur of the gorge of the Columbia. This highway is designated as a part of the National Parks Highway. It was constructed at the cost of several millions of dollars and it combines the skill of trained road engineers of large experience with the dreams of practical landscape artists. Upon one side the traveler sees several magnificent waterfalls, including the famous Latourelle, Wahkeena, and Multnomah Falls, and on the other hand the incomparable panorama of the Columbia River gorge. Should the Mount Hood national park project,[1] as recommended by you in your report to the President, be favorably considered by Congress at some future time, this beautiful highway should be continued to Mount Hood.

[1] Annual Report of Secretary of the Interior, fiscal year ended June 30, 1915, p. 23.

CRATER LAKE NATIONAL PARK.

Crater Lake National Park was rather late in opening this season, due to the fact that there was so much cold weather in the spring to prevent the thawing of the snow. If arrangements could have been made to establish snow sports in this park, as the Rainier National Park Co. did in the more northern park, the season could have been lengthened considerably. The time, however, for the utilization of the snow in Crater Lake National Park has not yet arrived. In time the early opening of the park, when the snow fields are available for skiing and tobogganing, will be advisable from an administrative standpoint and possible to concessioners. It is worthy of comment that Crater Lake Park when covered with a mantle of snow is a spectacle of marvelous beauty.

NEW TRAIL TO THE LAKESIDE.

Some very interesting development work was undertaken in Crater Lake Park this year under the $15,000 appropriation by Congress, including a broad new trail on a low grade from the rim of the crater to the surface of the lake at the old boat landing. This old trail, which made the lake accessible from the rim, was very narrow and steep and in places actually dangerous. A section of it was constructed through a wet gorge where running water constantly washed it out and made its proper maintenance impossible. The new trail is being constructed with the idea of making it possible for men, women, and children of all ages and conditions of health to get down from the rim of the crater to participate in the sports of boating and fishing on the lake itself.

The trail will be ready for use next year and will, I believe, result in lengthening the stay of every visitor to Crater Lake Park.

TRAILS UP GARFIELD PEAK AND TOWARD THE WATCHMAN.

Another new trail, constructed on a steeper grade, however, was built to the top of Garfield Peak. This trail will afford a very interesting side trip from the lodge on the rim and will afford an excellent view of the entire park and its surrounding region. Still a third important new trail was built along the rim in the direction of the Watchman. This will afford a splendid side trip for hotel visitors. The trails projected for next year include a broad new trail to the top of the Union Peak, a high mountain in the southern part of the park, from which a splendid view of the Klamath region may be obtained. It will also afford a beautiful trip through the forests of the park.

DIAMOND LAKE SHOULD BE ADDED.

Very little is known about the scenery of Crater Lake Park beyond that which is to be observed from the rim of the crater. The park really has an interesting variety of scenery, and its boundaries should be extended to include the Diamond Lake region to the northward. Then the park would have a variety of scenic features to offer to the tourist that would compare favorably with the diversity

of scenery in most of the very large mountain parks. Diamond Lake lies a few miles north of the park in a region that is valuable for none other than recreational purposes. Fishing in the lake could be improved and the region around about it made attractive for camping. A chalet or hotel, operated in connection with the hotel on the rim of Crater Lake, could be constructed near Diamond Lake when travel to the park warranted these additional accommodations. It would be reasonable to expect that the majority of visitors to Crater Lake would not overlook an opportunity to see the wonderful scenic region to the northward. Besides Diamond Lake the proposed addition to the park would include Mount Thielsen, a peak considerably over 9,000 feet in altitude and known as the "lightning rod of the Cascades," because during electric storms brilliant and fantastic flashes of lightning play about its needlelike summit.

INTERESTING SIDE TRIPS NEEDED.

Another area that logically belongs to Crater Lake Park is the Lake of the Woods region just south of the park. This area has not been investigated by representatives of the National Park Service, but it is known to be an exceptionally beautiful region and valuable for scarcely anything besides park purposes. The addition of the Diamond Lake and Mount Thielsen regions, however, can not be too strongly urged. A branch road from the main highway from Medford already makes the Diamond Lake country accessible, and at some future time a circle trip might be provided by the construction of a road from the north rim of Crater Lake to Diamond Lake.

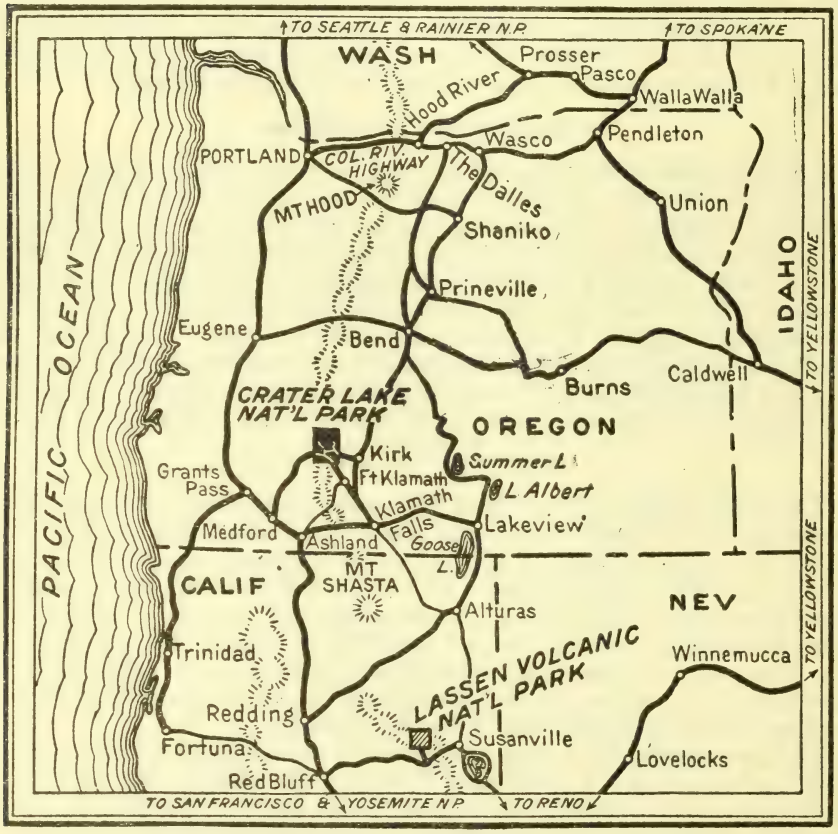
ROAD ROUND THE RIM.

The road system of the park has been maintained and new construction on the road around the rim of the crater carried forward under an appropriation of $50,000, to be expended under the direction of the War Department. It is expected that the clearing and grading of the rim road will be completed during the 1918 season, thus making it possible for the motorist to travel entirely around the lake on a well-graded road which opens up at every turn a thrilling vista, either of the lake itself or of the beautiful forest region surrounding the base of Mount Mazama.

The recommendation that I have made with respect to the control of the roads in the Yellowstone Park applies also to the road construction and maintenance in Crater Lake Park. All of this work should be done under the direction of the Department of the Interior rather than the War Department in order that uniform policy in the improvement of all parks may be formulated and followed and for the further reason that it is most desirable to have all park roads maintained for the benefit of the tourist solely and with his interest constantly in mind.

The roads leading to the various gateways of the park from Medford, Klamath Falls, and Kirk, Oreg., have not been in good condition during the past season. The road from Medford to the park boundary, a total length of 72 miles, was not built as an automobile road in the beginning and must be largely reconstructed. Jackson County and the citizens of Medford have spent large sums of money in improving sections of this road, and their work is of such a

permanent character that the surfacing of their improvements is all that now remains to finish them. It is a fact that Jackson County and its citizens have aided in the improvement of this road to the limit of their capacities, and the time has now come when the State of Oregon and the Federal Government must combine to permanently improve this main highway into the park. It is my understanding that the State of Oregon has already arranged to cooperate with the Federal Government and that the basis of Federal assistance under the good roads act is all that is necessary to be determined before improvement work is begun.



AUTOMOBILE ROUTES TO CRATER LAKE NATIONAL PARK.

APPROACH ROADS A COMPLICATED PROBLEM.

If a satisfactory basis can not be determined within a short time, it would seem that a new plan involving direct appropriations by the Federal Government and by the State for the purpose of rebuilding the approach roads, not only from Medford but from Klamath Falls, in connection with the intrapark system, should be devised. It must be understood that the counties of southern Oregon can not possibly build these approach roads or even keep them in repair. They can not raise sufficient funds by subscription or taxation—Jackson County, in which the Medford approach road lies, has already reached the limit of its authority to bond itself for road-building purposes.

It is amazing to observe the road construction that this county has already completed in the directions of Crater Lake and the summit of the Siskiyou Mountains. The road over the Siskiyou range was built to connect with the California State highway system and is already paved to the summit of the range. The State will double the width of the paving, but the grading and foundation for this additional surfacing has already been performed by the county. I mention this work because it emphasizes the efforts of the citizens of the Crater Lake region to do their share and more than could ordinarily be expected of them in the way of building first-class roads. Road building on the Klamath side of the park has been less extensive, but the country authorities are at work. This county, of course, is still less able to build first-class roads in the mountain regions, because its development has been more recent.

A park tour, including a trip over both the Medford and Klamath Falls roads—that is, in one gateway and out the other—is and should be the favorite way of seeing this park. The road up the Rogue River Canyon on the Medford side is interesting on account of the volcanic origin of the canyon itself and beautiful because there is so much timber and so many vistas of far-away scenery visible between the trees. On the other hand, the road down from Crater Lake to Klamath Falls through the Klamath Indian Reservation and along the shore of Klamath Lake is a scenic road of the highest order.

RETURN OF THE WILD FLOWERS.

Wild animals are becoming more numerous in the park, and it was observed this summer that a very few wild flowers are returning. There have been no wild flowers in the park since it was established, the sheep that ranged over this region before the creation of the park having utterly destroyed the wild-flower growth.

A WEIRD FRATERNITY HALL.

Among the visitors to the park during the 1917 season was a large group of members of the Knights of Pythias Order. Several years ago the Knights of Pythias originated the idea of holding initiation ceremonies in the crater of Wizard Island in Crater Lake, and the idea was carried out in a manner that afforded unusual delight to all who participated in the ceremonies. This year, on August 14, the visiting Knights held another conclave in the Witch's Cauldron, as the crater of the island is called, and once more the fraternity men announced a most delightful experience.[1] One can hardly imagine a more weird and mysterious environment for the initiation or other ceremonies of a fraternal order than the Witch's Cauldron, under the pale ghost-making light of a waning moon.

The story of travel to Crater Lake Park this season is not that of all the parks. The travel has been gratifying, but there was no increase over that of last year. There was, however, an increase in the number of automobiles in the park this year; 2,756 automobiles entered the park this season as against 2,649 last year. The total number of park visitors this season was 11,645 as against 12,265 last season.

[1] See picture in this report.

The park lies between the main line of the Southern Pacific Railroad and the Klamath Falls branch line. All through tickets between Portland and California points during the past season have entitled purchasers to stop over at Medford for the Crater Lake trip, and, should the traveler enter via one gateway and leave by another, his ticket was honored without question for continuation to his destination; thus it was possible to go into the park from Klamath Falls and out of the western gateway to Medford in connection

RAILROAD ROUTES TO CRATER LAKE NATIONAL PARK.

with a trip to Portland. On the other hand a party bound for California was permitted to stop at Medford, go through the park, and connect again with the Southern Pacific lines at Klamath Falls.

LASSEN VOLCANIC NATIONAL PARK.[1]

There is little that can be said about the Lassen Volcanic National Park, because no funds have been appropriated for its administration, maintenance, or protection since it was established under the

[1] Maps showing position of Lassen Volcanic National Park, pp. 845, 848.

act of August 9, 1916.[1] In fact no officer of the National Park Service has yet been able to visit the park and no plans have been made for its improvement. Officers of the Forest Service assigned to duty in the surrounding national forests have protected the park from fire and given such other consideration to it as was practicable and consistent with the performance of their duties.

The forest supervisor reports that 8,500 people visited the park during this season. Many motorists visited Mount Lassen while touring the parks of the Pacific Coast States. It is accessible from the California State highways and from the Southern Pacific Railroad. No concessions for transportation of passengers from the railroad or for the accommodation of tourists in the park have yet been granted. Accommodations are now provided for tourists by owners of patented lands within the park boundaries.

It is essential that funds be provided for the administration of Lassen Volcanic Park as a part of the park system. It has many wonderful scenic features and interesting volcanic formations. There are numerous lakes and streams well stocked with fish, and the forest growth of the park is especially worthy of note. The volcano has shown some activity during the year, but there have been no violent eruptions.

YOSEMITE NATIONAL PARK.

In the Yosemite National Park during the past year there has been improvement in every direction; improvement in roads and trails, improvement in accommodations for visitors and facilities for travel in the park by the erection of new hotels and camps and the installation of additional transportation service; and improvement in camp grounds, public utilities, and sanitation system. There has been a general increase in tourist patronage and an astonishing increase in motor-car travel. There have been larger appropriations by Congress for general purposes than ever before, and the revenues have been larger, thus making the consummation of much-needed improvement work possible. The year 1917 has been one of the most important years of Yosemite history.

FINE NEW HOTEL ON GLACIER POINT.[2]

Probably the most important project to be completed this year was the erection, furnishing, and opening of the new Glacier Point Hotel on the rim of the famous valley. This hotel was completed during the winter and formally opened to the public early in July. It is beautifully located on the very rim of the gorge where a magnificent view may be obtained of all of the great canyons through which the Merced and its tributaries flow. Vernal and Nevada Falls are plainly visible and the panorama of the peaks of the Sierra that may be had from the hotel beggars description. The hotel itself is very attractive from every point of view. It is equipped with every modern convenience; even electric energy for lighting is transmitted from the power plant in the valley below.

The new hotel was constructed by the Desmond Park Service Co., the general concessioner operating under franchises from the depart-

[1] 39 Stats., 442.
[2] See pictures in this report.

ment covering the establishment of a complete system of hotels, camps, transportation service, and other facilities for the accommodation of the traveling public. During the year this company added materially to its transportation equipment. It suffered one reverse in the loss of the dining room and lobby of its El Capitan Camp on the floor of the valley as the result of a fire. Merced Lake, Tuolumne Soda Springs, and Tenaya Lake Lodges, in the high Sierra, were operated during the summer. Two of these high mountain lodges were well patronized. Tuolumne Soda Springs Lodge, however, seems to have been poorly located and received little patronage, so was closed early, with a view to effecting its removal to a more advantageous site.

Conditions attributable directly to the war with Germany made the construction of the new hotel on the floor of the Yosemite Valley impossible, but the establishment of this much-needed enterprise will be undertaken as soon in the future as it is possible to make the necessary financial and other arrangements. Until this hotel project is completed, the old Sentinel Hotel will be retained. Before the opening of the next season, however, its accommodations will be greatly improved.

In addition to the Glacier Point Hotel and the lodges in the high Sierra, the general concessioner operated Camp Ahwahnee, Camp Yosemite Falls, and Camp El Capitan, all on the floor of the valley, and Crocker's resort on the Big Oak Flat road. Considerably more than a half million dollars has been expended in permanent improvements in the park by this concessioner.

Camp Curry, also in the Yosemite Valley directly under Glacier Point, was improved in many respects during the year, and was operated under the management of Mrs. D. A. Curry. Her husband, David A. Curry, "the stentor of the Yosemite," who founded and operated Camp Curry for many years, died in San Francisco on April 30, 1917.

In discussing hotel and camp accommodations for the Yosemite visitors, it is pertinent to remark that Miami Lodge, on the road between Merced and Wawona, has been greatly improved, and that very attractive additions to the Wawona Hotel have been completed during the past season. Neither of these resorts is within the boundaries of Yosemite Park, but they furnish incentives for delightful stop-overs en route to the park from Fresno, Madera, Merced, and other points, and are also patronized by travelers leaving the park by the southern gateway. Side trips may also be made to these points from the Yosemite Valley or Glacier Point.

COMPLETING THE NEW POWER PLANT.

Federal improvement of the park under appropriations by Congress and under the park revenues has gone forward rapidly. The new power plant, the erection of which was begun a year ago, will soon be completed. Originally $150,000 was appropriated for the installation of this plant, including dams, pipe lines, transmission lines, etc. Unexpected difficulties were encountered in excavating for the dam in the Merced River, which greatly increased the cost of this structure and made the completion of the plant under the original

Photograph by Asahel Curtis.

MOUNT RAINIER NATIONAL PARK.

NEW PARADISE INN, IN BEAUTIFUL PARADISE VALLEY.

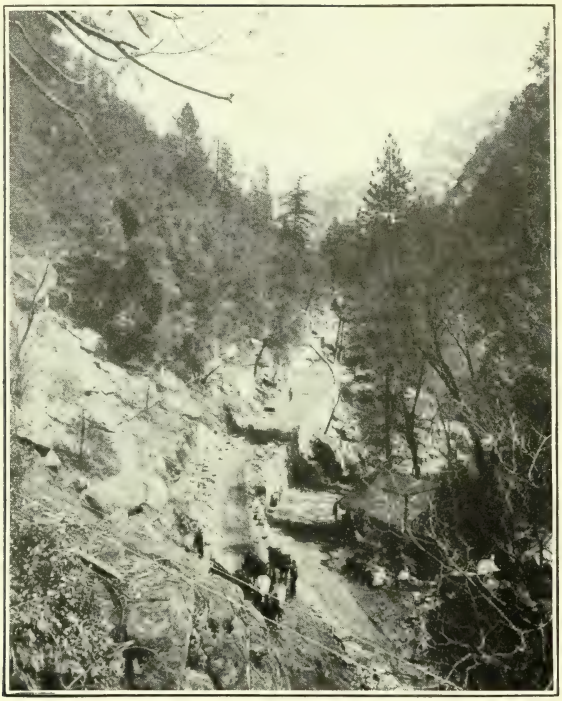
Note the wild flowers in the foreground.

Photograph by Curtis and Miller.

MOUNT RAINIER NATIONAL PARK.

PARADISE VALLEY.

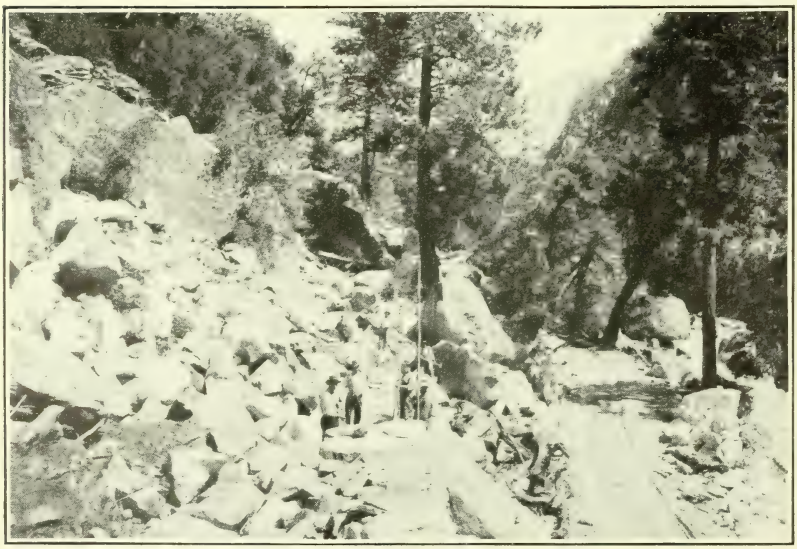
"Winter sports in the summer time." The human toboggan.



YOSEMITE NATIONAL PARK.

EL PORTAL ROAD.

Showing rock wall construction.



YOSEMITE NATIONAL PARK.

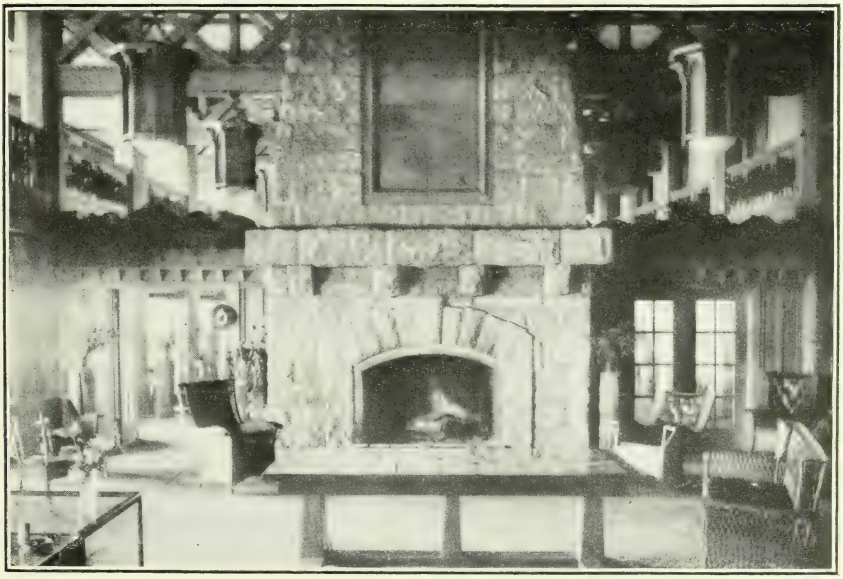
EL PORTAL ROAD.

Showing enormous rocks in the surveyed right of way. The picture above is taken near the same place after construction was well along.

YOSEMITE NATIONAL PARK.

NEW GLACIER POINT HOTEL.

Half Dome in the background.



YOSEMITE NATIONAL PARK.

INTERIOR OF NEW GLACIER POINT HOTEL.

Showing lobby and fireplace.

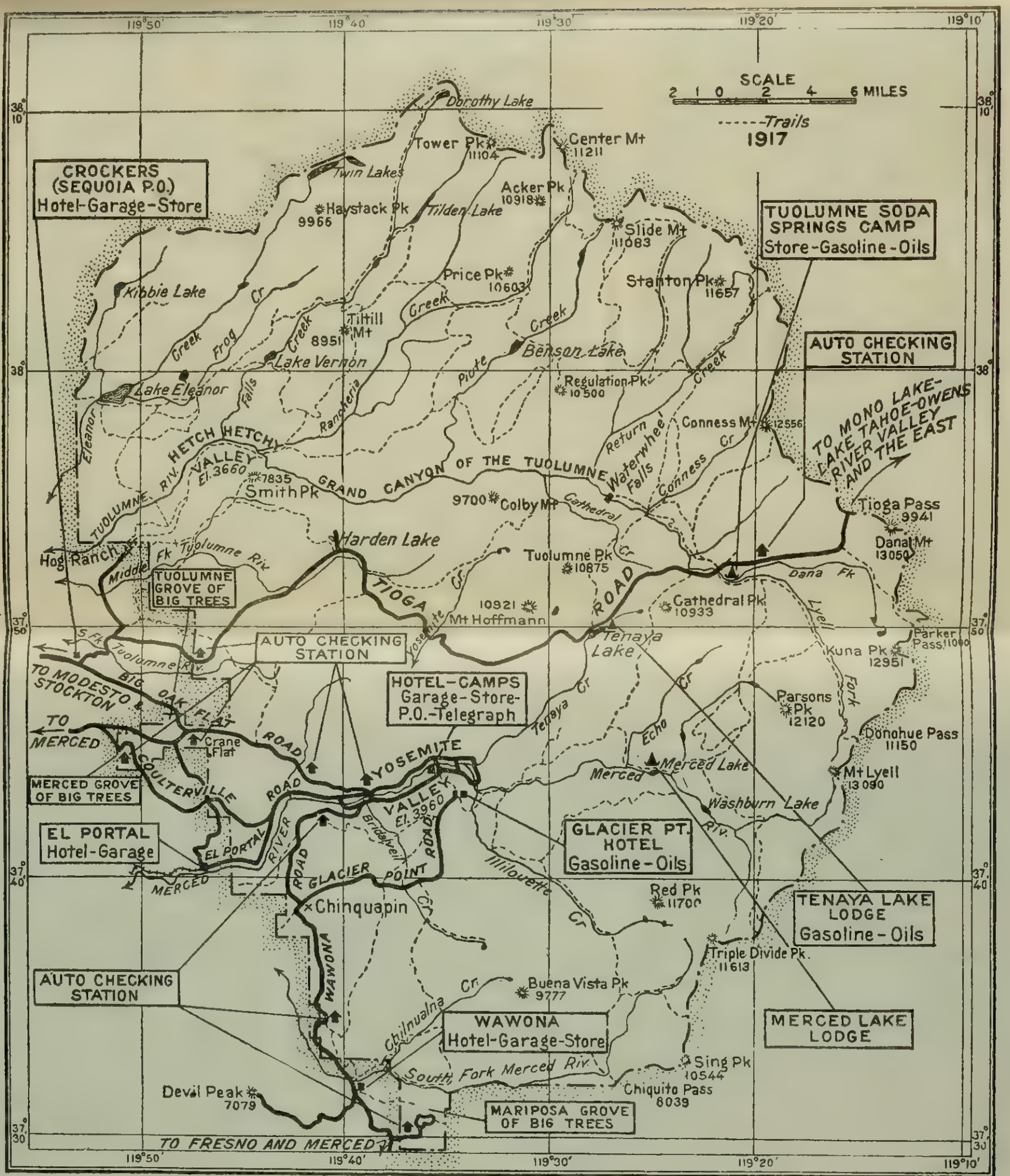
CRATER LAKE NATIONAL PARK.

NEW RANGER CABIN AT WESTERN OR MEDFORD ENTRANCE.

This cabin illustrates the type of ranger station adopted for this park.

CRATER LAKE NATIONAL PARK.

Knights of Pythias starting for Wizard Island, where their initiation ceremonies were held in the crater on August 14, 1917.



AUTOMOBILE MAP OF THE YOSEMITE NATIONAL PARK.

18923°—INT 1917—VOL 1. (To face page 936.)

appropriation impossible. It also became evident a year ago that a 1,000-kilowatt plant, the plant originally planned, would not supply the needs of the park. Accordingly, an estimate for an additional $60,000 was presented to Congress and this money was made available in the sundry civil act of June 12, 1917. Under this appropriation the plant will be completed. It will have a total capacity of 2,000 kilowatts and will furnish power for lighting the National Park Service buildings, hotels, camps, roads, and footpaths in Yosemite Valley, and for heating and cooking at the hotels and camps. The power house has been constructed on the Merced River and may be seen by all visitors entering the park via the El Portal road. It is a structure of simple but attractive design and the materials of construction used were steel and concrete.

The appropriations for the general improvement of Yosemite National Park, as I have stated, were larger this year than ever before. The heavy tourist patronage, especially the large increase in motor travel, naturally increased the park revenues over former years. The bulk of the funds available, however, was expended in the construction, maintenance, and improvement of the road and trail system.

EL PORTAL ROAD A MAGNIFICENT HIGHWAY.[1]

Seventy-five thousand dollars of the appropriation is being expended on the new El Portal road under the project adopted by Congress a year and a half ago. Thirty thousand dollars was spent upon the road last year. Work is progressing rapidly and satisfactorily, despite the fact that the construction of the new road to date has involved the heaviest and most difficult rock work of the entire project. The road, when completed, will be a magnificent highway and will connect at El Portal with a road of similar proportions which the State of California and cooperating counties will shortly build as a part of the State highway system. It was expected that State road would be constructed this year, but difficulties beyond the control of the State highway commission prevented the early initiation of construction work and it is not likely that the road will be commenced before next season. When completed, this State highway will furnish a splendid entrance road, with low grades, which will be open every month of the year.

With the park open in winter to both motorists and visitors by train, and with a new hotel on the floor of the valley to accommodate the winter traffic, Yosemite Park will probably become as famous as any winter resort in the world. The winter snow scenes in Yosemite Park are already famous and it is reported that the snow spectacle to be observed from the Glacier Point Hotel far surpasses even the domes and spires of the valley when clothed in their winter mantles. Yosemite Park also offers opportunities for winter sports that can not be excelled.

Besides the El Portal road, the Tioga, Big Oak Flat, and Wawona roads were maintained in good condition for traffic. The road system on the floor of the valley was also placed in excellent condition. When the improvement of the valley roads is completed during the autumn months, we may point proudly to this system as the best that the

[1] See pictures of the new El Portal road in this report.

national parks have to offer to the traveler. The Yosemite Valley has long needed a proper road system, and when one considers the fact that there are weeks during the summer when several hundred cars are being operated in this relatively small area each day, and that there may be during this time four or five thousand visitors in the valley all told, no road system may be considered too highly improved for this public use.

WAWONA ROAD ACQUIRED AND TOLLS ELIMINATED.

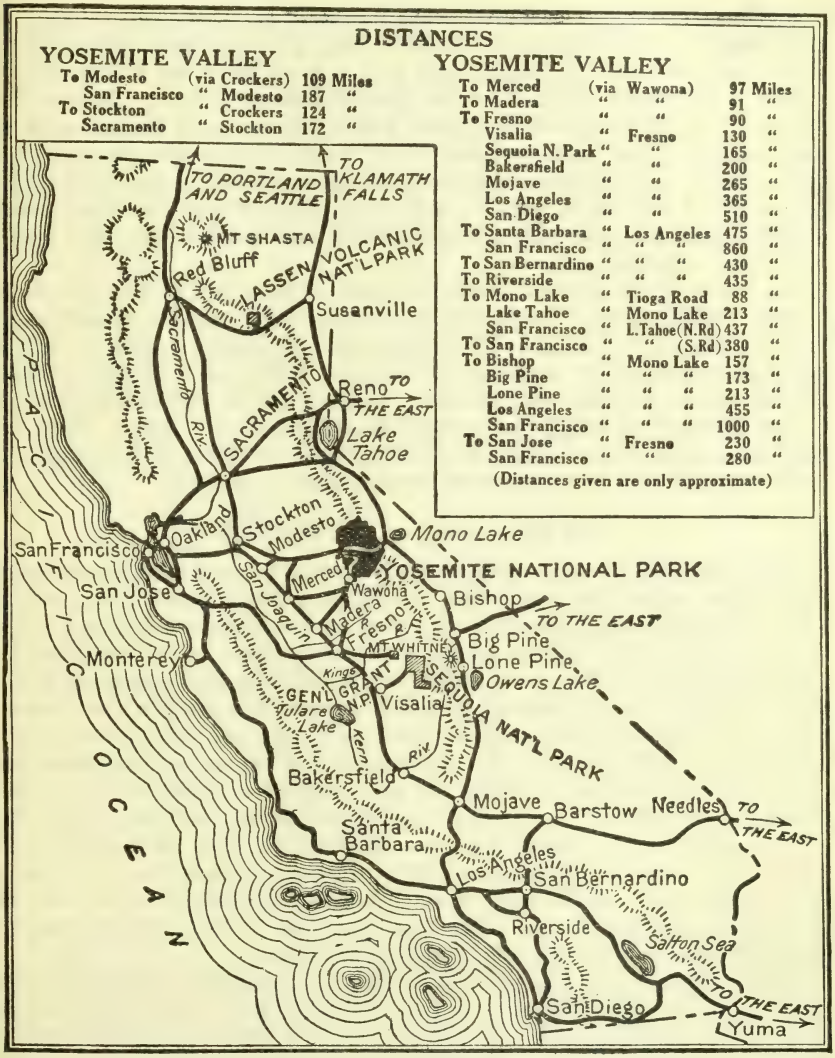
The old Wawona toll road system connecting Wawona with Fort Monroe, near Inspiration Point on the rim of the Yosemite Valley, with its lateral to Glacier Point from the old stage station at Chinquapin, was turned over to the Federal Government by its owners in the spring of this year. Tolls, of course, were eliminated, and during the season the road system was maintained by the National Park Service. All of the old toll roads except the Coulterville road, which is no longer in general use, have now been acquired by the State or Federal Government. The Yosemite Stage & Turnpike Co., the corporation that built and maintained the Wawona toll road system for many years, still operates an automobile transportation line from Merced, by way of Miami Lodge and Wawona, to Yosemite Valley, in connection with what is called the "Horseshoe route," because passengers are carried in one direction by automobile and in the other by the train service of the Yosemite Valley Railroad.

REMARKABLE TRAVEL FACTS.

The popularity of the roads of the Yosemite is best proven by reference to the automobile travel for the season. Cars to the number of 6,521 entered the park prior to October 12, as against 4,043 last year. A complete analyzation of this traffic by park entrances will be found on page 931 in the report of the supervisor of Yosemite Park. All of the gateways enjoyed a gratifying share of the motor travel. It should be understood, of course, that nearly every motorist enters the park by one gateway and leaves by another, whenever time and his vacation arrangements will permit.

In this connection mention should be made of the Tioga road crossing the central part of the park, a scenic highway which runs through Tioga Pass on the crest of the Sierra, where it connects with the Tioga State road in the Leevining Canyon. At Mono Lake the Leevining Creek road joins the State highway system on the eastern side of the mountains, running from the northern part of California through the Lake Tahoe region, thence to Mono Lake and the Owens Valley, and on to southern California. At Lake Tahoe this State road intersects the Lincoln Highway. It appears that both California and eastern motorists traveling over the Lincoln Highway to Lake Tahoe during the past season made the trip to Yosemite by way of Mono Lake and the Tioga road. In fact, one of the most popular automobile roads in California is the Lincoln Highway or its feeders from coast and central California points to Lake Tahoe, thence south on the State highway to the Tioga road, and over this scenic Federal link in the circle trip to the Yosemite, and finally back to the central valleys.

While the popularity of the Tioga road among California motorists has been growing rapidly and it has been used considerably by eastern traffic reaching Lake Tahoe by the Lincoln Highway, it has not received the patronage of the eastern cars that its scenic character invites. Hundreds of motorists have, during the past season, left the Lincoln Highway at Ely, Nev., and have gone over the Midland



AUTOMOBILE ROUTES TO YOSEMITE NATIONAL PARK.

Trail into California, and after reaching California have gone south into the southern part of the State instead of turning north at Big Pine on the State highway and crossing the Sierra Nevada Mountains by way of the Tioga road and Yosemite Park. Lack of information regarding this route has, of course, caused these motorists to go over the Mojave Desert instead of taking the State highway

north at the village of Big Pine and thus enjoying the beautiful mountain trip through the park. It shall be our purpose to assist in the dissemination of information regarding the Tioga road next season to the end that it may enjoy the eastern travel that it rightly deserves.

THE YOSEMITE AND LAKE TAHOE.

In this connection I record with pleasure the decision of the Lincoln Highway to include in its new road guide a description of the scenic beauties of the Tioga road and a map showing this route.

The astounding increase in the Tahoe-Yosemite travel makes close cooperation between the National Park Service and the various resorts along "The Lake of the Sky"[1] advisable, and it should be our purpose to foster the maintenance of cooperative relations to the end that the traveling public in both of these beautiful high Sierra playgrounds may have opportunities to visit and enjoy each in the course of a summer season.

As I stated in the beginning of this discussion of the Yosemite season, travel to the park this year has been heavier than at any time in the past. People to the number of 34,510 registered at its gates this season, as against 33,390 last year. The major portion of the travel was by automobile. There was a noticeable increase in the number of camping parties in the park this year. The free public camps of the Yosemite Valley were occupied throughout the summer, and early in the season were quite congested.

THE FALLS ARE ALWAYS BEAUTIFUL.

The travel to Yosemite Park early in the season invites comment. For many years the idea that Yosemite's chief attractions are its waterfalls has been prevalent, and this impression is really operating to discourage the traveler to the park at a time when the facilities for the accommodation of visitors, opportunities for motoring, horseback riding, hiking, boating, and fishing are better than ever before. The general impression still exists that if one can not see the Yosemite in the spring when the volume of the waterfalls is abnormal, the park is not worth seeing at all. Hence thousands of visitors throng the valley in June, and in August, when the Tioga, Big Oak Flat, and Wawona roads are open and in the best of condition for motoring, when all of the beautiful camping sites in the high Sierra are inviting the vacationist, when the lakes and streams all over the park are accessible to the fisherman and the boating sportsman, the park enjoys a comparatively small patronage.

The waterfalls in the spring, of course, are more wonderful than they are in the late summer or fall, but they are extremely beautiful then, too. Besides, they are only one of scores of Yosemite attractions, and the visitor to this great park should either plan to come early and stay late, or time his trip to make possible the full enjoyment of all that the park has to offer, not only in the incomparable valley, but throughout its great mountainous area of 719,622 acres.

The sport of boating on the Merced River was developed this summer for the first time and it promises to become one of the

[1] George Wharton James has written a book on Lake Tahoe entitled "The Lake of the Sky."

leading amusements of the valley in the near future. The vistas of the carved walls and wonderful glaciated features of the Yosemite Gorge from a motor boat on the Merced are worth going a long distance to see.

THE FAMOUS FIREFALL REESTABLISHED.

The famous firefall from Glacier Point was authorized again this season and nightly delighted hundreds of visitors who gathered to see it.

THE SIERRA CLUB IN THE PARK.

The Sierra Club held its 1917 outing in the Yosemite Park and headquarters were established at Tuolumne Soda Springs, where the club recently erected the Parsons Memorial Lodge, a picturesque structure which is used as a gathering place for club members and their friends. From the Tuolumne Soda Springs members of the club explored all of the surrounding mountain regions, engaged in the sport of climbing the highest peaks of the park, and enjoyed together the camp-fire sports and songs that make Sierra Club life in its mountain camps so delightful. The club will also spend next summer in the park. A permanent camp will again be established at Tuolumne Soda Springs and expeditions will be made from this base to Mount Ritter, Thousand Island Lakes, the Devil Postpile Monument, etc. It will also explore the Ten Lake Basin, a beautiful region that is rarely seen by the park visitor.

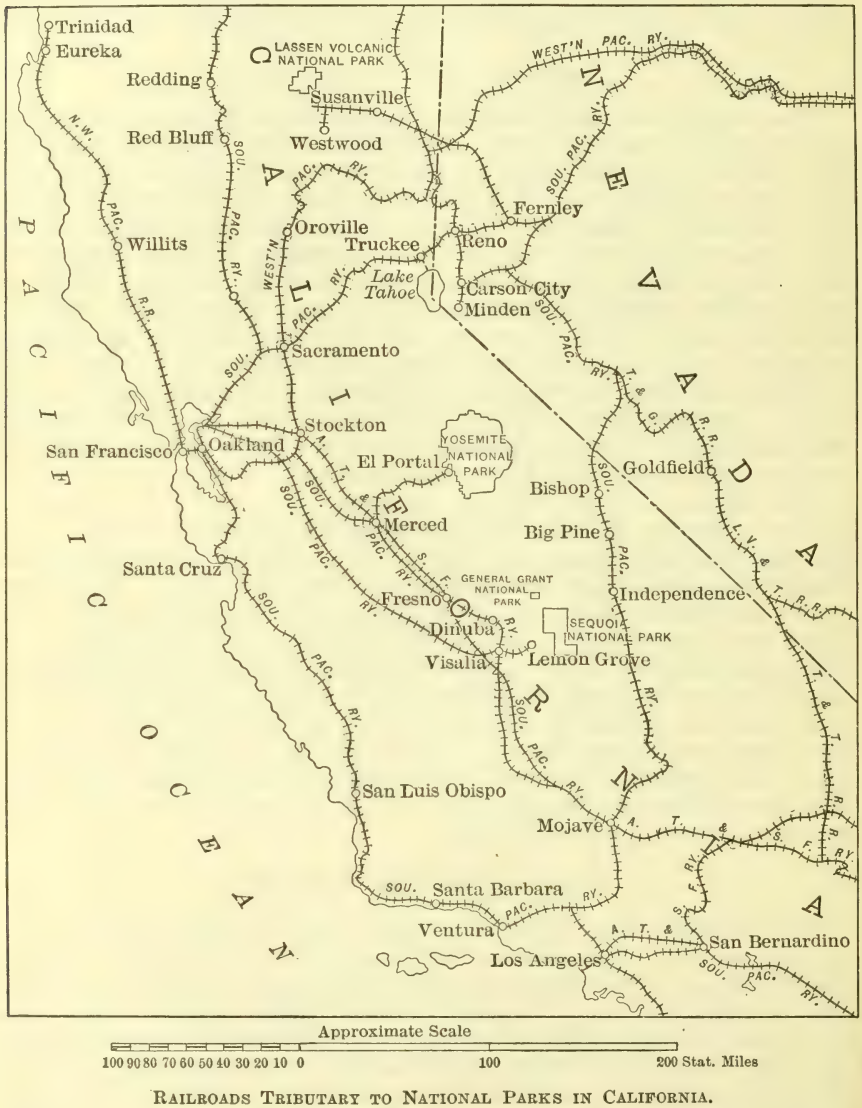
The National Park Service welcomes the use of the national parks by the big mountaineering organizations of the country. The Prairie Club of Chicago has visited Mesa Verde, Yellowstone, and Glacier National Parks during the past three summers. This season it was in Glacier Park for three weeks. The Mountaineers of the Northwest have visited Mount Rainier annually for many years. The Colorado Mountain Club spent several summers in the Rocky Mountain Park region, and the Sierra Club makes a practice of going each year into either the Yosemite Park or the beautiful regions of the Kings and Kern River Canyons, which it is now proposed to add to the Sequoia National Park. Another western mountain club that has visited the parks on its outings is the Mazama Club, with headquarters in Portland, Oreg.

CENTER OF THE JOHN MUIR TRAIL.

The relation of the John Muir trail to the parks of California is an intimate one and deserves attention here because the Yosemite Park is about to become the center of this important high mountain trail system. It was projected several years ago by the Sierra Club, and an appropriation was made by the State of California for its construction south from the Yosemite Park through the Kings River country to the summit of Mount Whitney. This trail traverses the finest scenic regions of the Sierra Nevada Range, and should the Sequoia Park be enlarged as proposed it will form an important means of travel and communication between the two parks. It is now proposed to extend the John Muir trail north to Lake Tahoe, through another region of scenic grandeur. When this extension is

completed, the Yosemite Park will become the center of the John Muir trail, and in any event it should become the mecca for hikers from all over the country, as well as those who enjoy traveling in the mountains with a pack train.

The wild animals of Yosemite National Park are increasing, but here again we have a situation that demands State cooperation. The



RAILROADS TRIBUTARY TO NATIONAL PARKS IN CALIFORNIA.

deer of the park are driven down into the lower altitudes by the snow and eventually wander outside of the park boundaries, where they are killed by the hundreds. A game refuge just outside of the park should be established at the next session of the State legislature, in order that these animals may receive proper protection. As I

have pointed out in discussing Mount Rainier problems, hunting in a few years just beyond such a refuge would be better by far than it is now. Near several of the national parks State game refuges, such as those established by Wyoming and Montana outside of Yellowstone National Park, should be created by the State in order to give the park animals a larger measure of protection.

The principal railroads approaching Yosemite National Park are the Southern Pacific and Santa Fe lines, both of which connect with the Yosemite Valley Railroad at Merced. These two lines have promoted travel to the park this year as usual, and have made very satisfactory arrangements for through service. Through most of the season two trains a day from San Francisco and Los Angeles were operated by each line. Excursion tickets covering a trip to Merced by rail, thence over the automobile line of the Yosemite Stage & Turnpike Co. to Wawona and Yosemite Park and return by El Portal and the Yosemite Valley Railroad to Merced, were sold throughout the season. These arrangements for entering the park through one gateway and leaving in another direction received the hearty approval of the Yosemite patrons and there was considerable travel over this "Horseshoe route."

SEQUOIA NATIONAL PARK.

The most important work accomplished in Sequoia National Park during the past year has been the assumption of control of the Giant Forest lands by the National Park Service and the preparation of these lands for the use of the traveling public, especially the camper and angler. The Sequoia National Park was originally created to preserve the great redwood trees (Sequoia washingtoniana, or gigantea, as they are sometimes called) of the Giant Forest, but after the park was established it was discovered that practically the whole forest was patented to parties who had taken up the land under various laws relating to the disposition of the public lands. For 26 years the anomalous situation of this noblest forest on the earth, being located in a national park and yet privately owned, continued to exist.

Finally, in 1916, Congress appropriated $50,000 to purchase these private holdings. This sum proved to be insufficient when negotiations for the purchase of the lands were initiated with their owners. For a time it looked as if the purchase could not be consummated, but finally the National Geographic Society came to the aid of the department and made available from its funds the sum of $20,000, the additional amount needed to effect the acquisition of the Giant Forest lands. The transfer of the lands was formally completed in January of this year and the full consideration, $70,000, was paid over to the former owners upon the tradition of the deeds to a representative of the National Park Service in California.

Thus the Giant Forest came back into the public domain, there to remain to the end of time for the pleasure and edification of all future generations. It is reasonable to assume that the trees of the forest will stand until the end of time, because many of them are already 4,000 years of age and still as vigorous as the saplings of a fews decades' growth.

Much of the forest has been cleared during the season and made available for camp grounds. The water system has been extended to the recently acquired areas and the sanitation of new grounds has been carefully provided for. Underbrush and superfluous tree growths that have hidden many of the giant sequoias from view have been removed in all parts of the Giant Forest and along the road to Moro Rock. Hundreds of magnificent and inspiring vistas of the great trees as they stand singly or in groups will delight the visitor to Sequoia Park next season.

INCREASING NUMBER OF CAMPERS.

During the past season the park enjoyed an astonishing increase in patronage. The largest increase was in the number of people visiting the park in private automobiles. Hundreds of visitors came and camped in the Giant Forest for weeks. Many others went on up to Wolverton, above the forest, and camped where they could fish in Wolverton Creek or in the Marble Fork River, a short distance beyond.

It was a most pleasing sight to stand in the midst of the Giant Forest during the past summer and gaze upon the attractively situated and tastefully decorated camps nestled each at the base of an enormous Sequoia. It was a peaceful scene and a beautiful one. There was nothing to do in the forest but rest, breathe the health-restoring air, drink the clear, cold water, and contemplate the dignity and beauty of the biggest and oldest of living things. Fishermen came and went, and the hikers and horseback riders took to the trails and returned from the higher altitudes of the park, but the peacefulness and quietude of the forest was never disturbed. Camping in the Giant Forest is all that anybody has written about it and more. It is a glorious experience.

The enormous increase in travel to the park this year early in the summer disclosed the fact that it would only be a matter of a year or two before all available camping space would be taken long before the height of the season; also that the streams of the park, unless carefully stocked each year, would be fished out before the summer would be half gone. Anticipating the inevitable need of more camping grounds, the Giant Forest road has been continued from Wolverton to the Marble Fork River, where a splendid opportunity for the development of a fine big camping area exists. There are no Sequoia trees here, but there is a fine forest of pines and firs, and the ground is covered with a clean white gravel that will make camping especially satisfactory. This new camp area will be near the best fishing waters that are at all accessible, and an effort will be made to keep these waters well stocked with trout.

To provide sufficient trout for the streams of the park hereafter, and particularly for the Marble Fork River, there should be a field hatchery established in the park itself.

ROAD TO THE GENERAL GRANT NATIONAL PARK.

The road which is just being extended to the Marble Fork River should be continued in the next year or two to the north boundary of the park where connection may be made with the road which Tulare County is now building to connect the General Grant Park

with the Sequoia Park. I inspected the county road during the past summer, and found that an excellent highway is being constructed between the two parks.

The road traverses a scenic region, and the engineers who are building the highway are disturbing natural conditions as little as possible. When this county road and the Federal connection in Sequoia Park are completed, the circle route through the two national parks will afford one of the most interesting scenic trips of the national-park system. Few park roads will enjoy a larger patronage than this new road because every party that goes into either General Grant or Sequoia Park will visit both before leaving this scenic region. I can not too strongly recommend the continuance of the Government road work in order that the two national parks may be connected by the automobile highway as soon as possible.

No discussion of Sequoia road conditions would be complete without a mention of the Marble Fork Bridge on the road which makes the Giant Forest accessible. Many years ago a timber structure was built to span the Marble Fork. A few years ago it began to show signs of weakening, and nearly two years ago a portion of it fell into the stream under the pressure of snow accumulation. An appropriation of $6,750 was made by Congress to erect a new bridge on the site of the old structure, but it was impossible to obtain a bid for the erection of the bridge. Several different designs for the bridge were submitted, but all efforts to obtain consideration of the project were unavailing. The money appropriated was returned to the Treasury, and another estimate in amount $12,000 is being submitted for the bridge project.

It is very doubtful if any substantial structure can be erected over the Marble Fork River at the crossing of the Giant Forest road for any less than $12,000. Funds for this bridge should be made available in the early future, because the old bridge, which has been temporarily repaired, is likely to fall again during the period of heaviest snows in the park.

A few years ago the Mount Whitney Power & Electric Co. constructed a road up the Middle Fork of the Kaweah River. It operates a power plant in this canyon, and the road was built to make this accessible. It has, however, been thrown open to general tourist use. It was considerably traveled during the past season by motoring parties. The road is known as the Elk Park road because in the Middle Fork Canyon there is a small herd of elk ranging.

The Mineral King road, farther south, should be reconstructed, especially when the area east of the park, including part of the Mineral King region, is added to the park. This road constitutes the only means of reaching Mineral King.

WANTED: HEADQUARTERS.

While, from the tourist's point of view, the Giant Forest has been excellently developed during the past season, from an administrative point of view a most essential improvement remains to be accomplished. I refer to the great need of adequate administrative buildings in the Giant Forest. At the present time there is no residence for the supervisor of the park, no office from which information may be given to the public, and no place where the supervisor can come

in contact with the public except around a camp fire at night and in one of the photographic galleries, the store or the hotel-camp, during the day. Funds should be immediately provided for two or three buildings in the Forest, and proper furnishing for same. Such new buildings would make the administrative problems of the park much easier of solution and would please the traveling public.

Last winter a huge Sequoia tree, over 20 feet in diameter at its base, fell over during a fierce wind storm. Fortunately, it was a tree near the road to Moro Rock. It now lies almost parallel to the road, and automobiles can be taken upon its prostrate form with little difficulty. It has afforded much amusement for motorists during the summer. Automobiles can be operated over the tree for a distance of more than 200 feet, and 20 small cars can be driven upon the tree at the same time. There is a picture in this report which shows an automobile camp established upon the trunk of the tree at its largest diameter.

STAIRWAY TO THE SUMMIT OF MORO ROCK.[1]

Another feature of unusual interest to Sequoia visitors during the past summer was the stairway to the summit of the great granite dome, Moro Rock. This stairway was built to afford the best possible opportunity to view the magnificent scenery of the park region and the mountains beyond. Moro Rock, 6,719 feet in altitude, is a monolith of enormous, yet graceful, proportions. Its summit is nearly 4,000 feet above the floor of the valley of the Middle Fork of the Kaweah below, and the huge granite mass stands apart from the canyon wall in a manner that affords one a marvelous panoramic view. The new steps to the summit were built carefully and are perfectly safe. As the top of the rock is flat, and there is no opportunity to gaze down perpendicularly, it may be enjoyed by most people without fear of dizziness.

The view from the top of the rock is indescribably wonderful, the panorama of the peaks of the Great Western Divide being the most thrilling scene to greet one as he mounts the summit of Moro.

The trails of the park have also been extensively improved during the season, and there has been much travel over them, both in the direction of the Kings River gorges and the canyon of the Kern. The Giant Forest is a favorite starting point for extended pack-train trips into the high Sierra of the Kings and Kern regions, both of which are scenic regions that can not be surpassed in the entire world.

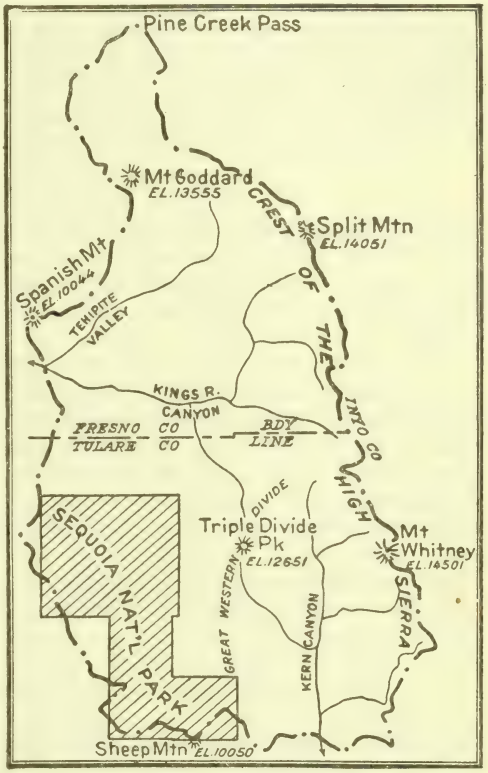
"THE GREATER SEQUOIA."

This leads me to the project which contemplates the addition of the Kings River country, the Great Western Divide, the Kern Canyon, and about 70 miles of the very crest of the Sierra Nevada, including Mount Whitney, the highest mountain in the United States, exclusive of Alaska, to the Sequoia National Park. The proposition is called the "Greater Sequoia" project. It stands at the very top of the list of meritorious park extension projects, and we earnestly hope that Congress in its next session will enact legislation along the lines of

[1] See picture in this report.

Senator Phelan's bill (S. 2021), entitled "A bill to add certain lands to the Sequoia National Park."

The accompanying map shows the boundaries of the proposed enlarged park. The mountainous area to be added is valuable for no purposes but those of a national park. There is practically no merchantable timber on the lands, and most of what is classed as merchantable is giant Sequoia timber that should be preserved for park purposes and not sold to lumber interests to destroy. There are relatively small grazing areas in this region, and some of the grazing land should be set aside for pasturage of tourist stock. Ultimately, it may all be needed for the visitors.



MAP SHOWING BOUNDARIES OF PROPOSED GREATER SEQUOIA NATIONAL PARK.

By far the largest portion of the whole territory involved in the extension plan is a wild mountainous region of extraordinary grandeur, a tumbled sea of mountain peaks from 12,000 to over 14,000 feet in altitude, with Mount Whitney as the climax of the whole thing; with hundreds of lakes, clear as crystal, beautiful beyond description, and many of them well stocked with trout; with great deep gorges that compare favorably with the famous Yosemite Valley, gorges that were carved by the Ice King in the same manner as the Yosemite was chiseled from the solid granite; with raging rivers, great waterfalls and even glaciers; a region that is national park in character from north to south and from east to west, every foot of it.

This park extension was recommended to the President by you in your annual report for 1915.[1] In this report the following statement was made:

> Congress so carefully cut the boundaries of the national parks to the express purpose for which each was created that, in some instances, scenic features of the very first order were excluded. In the careful study which the department has since made of each such territory it has become apparent that, in several instances outlying territory should be added to these reservations. The most distinguished of these instances is Sequoia National Park, the boundaries of which should be extended to include the superb Kings Canyon on the north and on the east the Kern Canyon and the west slope and summit of Mount Whitney * * *.[2]

[1] See Annual Report of the Secretary of the Interior, 1915, pp. 25 and 121.
[2] Annual Report of the Secretary of the Interior, 1915, p. 121.

In Director Mather's report, "Progress in the Development of the National Parks, 1916," the following statement with reference to the Greater Sequoia project was made:

Bills providing for enlarging Sequoia National Park to include the Kings and Kern Canyons and several miles of the crest of the Sierra Nevada, including Mount Whitney, are now pending in Congress and will be considered in the short session which convenes in December. The early enactment of this legislation can not be too strongly urged.

The public land proposed to be added to Sequoia National Park by these measures will never be valuable for any other than park purposes. * * *

Sequoia Park now has the giant Sequoia trees as its one attraction, but if enlarged as proposed it will become a scenic park of as much distinction as that possessed by any other park in the system. Furthermore, it will become a game sanctuary of as much importance as the Yellowstone National Park.[1]

A GREAT ANIMAL SANCTUARY.

The wild animal sanctuary feature of the park project emphasized by Director Mather is most important. Should Congress authorize the extension as proposed, the Sequoia Park as a great animal refuge would take its place with Yellowstone and Mount McKinley Parks.

From every point of view the Sequoia extension is a meritorious project and should receive early consideration by Congress. Within a short time the encroachment of the timber interests will seriously impair the scenic value of much of the lower country, and the alienation of lands in other sections of the region will make its development as a national park more difficult.

Summarizing travel to the Sequoia Park for the 1917 season, there were 18,510 visitors to the park as against 10,780 last year; 2,334 automobiles this year as against 736 last. The revenues for the year were higher than ever before, $10,326.60, as against $5,169.86 for 1916.

GENERAL GRANT NATIONAL PARK.[2]

General Grant National Park is small but one of the rarest jewels to be found among California's chain of high and rugged mountains. Nestled in a forested nook in the Sierra, it welcomes each summer almost as many visitors as its neighbor, the Sequoia National Park, and offers camping facilities that compare favorably with those of any other national park. It is true that side trips from this park are not so numerous as those of other larger parks nor is fishing as easily found, but, so far as the ordinary requisites of a good camping area are concerned, the park is not to be eclipsed by any other.

Water is piped from springs of clear, cold, perfectly pure water to a large number of beautiful camp sites. Each year the greater influx of visitors has made extensions of this water system necessary. Already a larger extension than usual is being made to meet the demands of next year's travel. Shower baths are also being installed. The camping scene in the Giant Forest was not more pleasing to

[1] See also Proceedings of the Fourth National Park Conference, Washington, D. C., Jan. 2 to 6, inclusive, pp. 337 to 362. "Problem of the Greater Sequoia," by Representative Frederick H. Gillett, of Massachusetts; "National parks and the railroads," by E. O. McCormick, vice president, Southern Pacific Co.; "Perhaps our greatest national park," by Enos Mills; "The Top of America—Mount Whitney," by Emerson Hough; "The Tehipite Valley and Kings Canyon," by Robert Sterling Yard.

[2] Maps showing position of General Grant National Park, pp. 845, 848.

observe than that of General Grant Park. Approximately 700 people were camping in its beauty spots when I visited the park in August. Some families had been there for more than six weeks, and there were a few who had no plans for leaving the park during the remainder of the summer.

The forest of giant Sequoia trees in General Grant Park is its most striking and most important feature. It is a wonderful grove. Its giant of giants, the General Grant tree, is very conspicuous, as are several other monster trees. Beyond the Sequoia grove just outside of the park boundaries lies Sequoia Lake, a body of water that must have been very pretty when it was surrounded by the forests that have long since been cut away. The lake, however, affords opportunities for boating and swimming, and if it can be kept stocked with trout it will become popular with the fishermen.

Travel to the park this year is 17,390, as against 15,360 last year. Automobile travel was also heavier, 2,158 cars having entered the park as against 1,778 last year.

Public accommodations for visitors to the park are not what they should be and an effort will be made to reorganize the camp concessions before the opening of the 1918 season. The camp is small and inadequate and has not been well managed.

The needs of General Grant National Park are not many. The small-road system needs some improvement. A new road should be built from the central part of the park to the Sequoia grove. The existing road to the grove is in good repair, but its grades are very difficult to negotiate except with a high-power car. An administration building should be constructed which would house the post office and information bureau.

With these improvements to be made in the park it would need a very small sum of money for its maintenance. Probably the revenues of the park will provide for its maintenance, protection, and improvement. In my discussions of conditions in Sequoia National Park I mentioned the construction of the road to join the two parks by the county of Tulare. It is now possible to travel on this new road from General Grant Park as far as the Big Meadows in the region proposed to be added to Sequoia.

MESA VERDE NATIONAL PARK.

From a dozen points of view Mesa Verde National Park stands shoulder to shoulder with all the other important members of the national park system, yet it was little visited by the traveling public until the last two or three years. There seems to have been a strange idea abroad in the land that Mesa Verde Park was not easily accessible, that there were no satisfactory accommodations for visitors to this park, and that it was located in a remote section of the country which was a combination of desert and mountain that was not altogether attractive. It seems, also, the idea that there were "only ruins" and nothing else to invite the traveler discouraged tourist travel to this park.

No more completely mistaken impressions could possibly seize the mind of man than these conceptions of Mesa Verde Park. In the first place, Mesa Verde is readily accessible, and it costs practically the same to make a trip to this park as it does to visit Yellowstone

and Glacier. In the second place, there are very comfortable accommodations in the park for the traveling public, and in the little town of Mancos, the railroad point nearest the park, there is an excellently managed hotel. In the third place, Mesa Verde Park is located in one of the most beautiful sections of the Southwest. There is no desert in nor near the park, and if there were it would only add to its loveliness, because after all the desert of the Southwest is exceedingly beautiful.

Mesa Verde, however, stands in the midst of fertile valleys. On one side there is the broad green valley of the Mancos, filled with farms and a contented people, and on the other side there is the beautiful Montezuma Valley, equally fertile and also intensely cultivated by the thrifty owners of its farms, and south and southwest of the park lies the Southern Ute Indian Reservation.

A LAND OF WONDERFUL BEAUTY.

The Mesa Verde itself is about 15 miles long by 8 miles wide and rises abruptly from the Montezuma and Mancos Valleys over a thousand feet. It is called the Mesa Verde (green table-land or plateau) because it is covered with a fine growth of cedar trees. This tree growth adds much to the scenic character of the park. The panorama of the surrounding region that one obtains from the top of the mesa is even more wonderful than the scenery of the mesa itself. Below the Montezuma and Mancos Valleys lie peaceably in the protecting embrace of the distant mountains. Over to the west lies the Sleeping Ute Mountain and south of the park Shiprock greets the gaze of the awe-inspired visitor, and on the north and east the high peaks of the Colorado Rockies pierce the very skies.

This view from the rim of the mesa is marvelous at any time, but at sunset it is more beautiful than at any other time of the day. It is sufficient to state that the Mesa Verde sunset is alone worth a trip to southwestern Colorado. So much for the summary of the location of the park and its natural beauties. The ruins, of course, constitute its greatest charm, and no one can appreciate what these ruins are unless he has seen them.

Mesa Verde is cut by numerous deep canyons running in a northerly and southerly direction through its entire length. These canyons begin with small depressions at the north end of the mesa and become deeper as they approach the canyon of the Mancos River beyond the south boundary of the park. In these canyons the peoples of a forgotten race erected among the cliffs the magnificent structures that the park was established to forever preserve. Just as it is impossible to paint a word picture of the magnificence of Mount Rainier, the unbelievable beauties of Crater Lake, the enormous dimensions of the Sequoia trees, so also is it impossible to tell the story of the great cliff dwellings of the Mesa Verde. When one stands on the edge of a canyon and looks upon one of the great cliff dwellings, such as Cliff Palace or Spruce Tree House, he is overcome with the same emotions that grip his very soul at the edge of the Grand Canyon. The scene can not be described in words, neither can the feeling that one experiences.

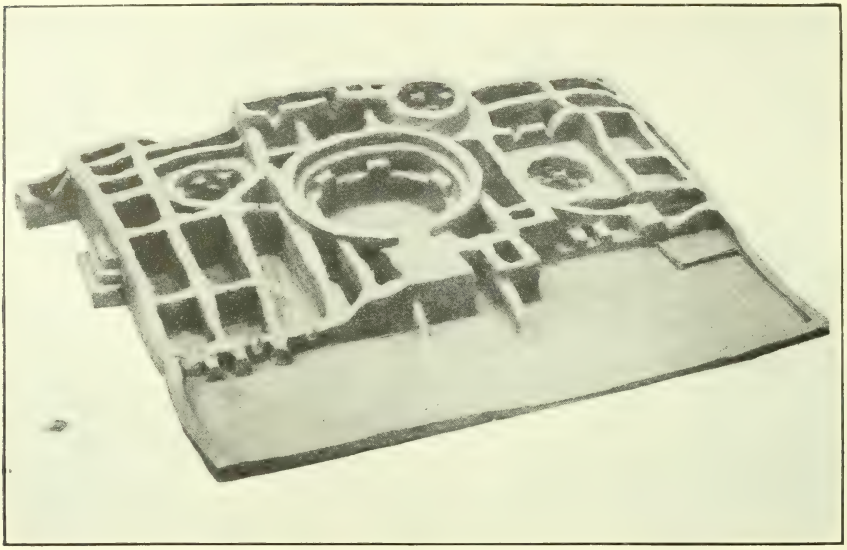
SEQUOIA NATIONAL PARK.

Camping out on fallen sequoia tree, over 20 feet in diameter at base.

SEQUOIA NATIONAL PARK.

MORO ROCK.

This picture shows the new stairway, 346 feet in length, erected to the top of the great granite monolith.



MESA VERDE NATIONAL PARK.

Photograph of a model of Far View House as uncovered last year.
Reprinted from "Explorations and Field Work of the Smithsonian Institution in 1916."

Photograph by G. L. Beam.

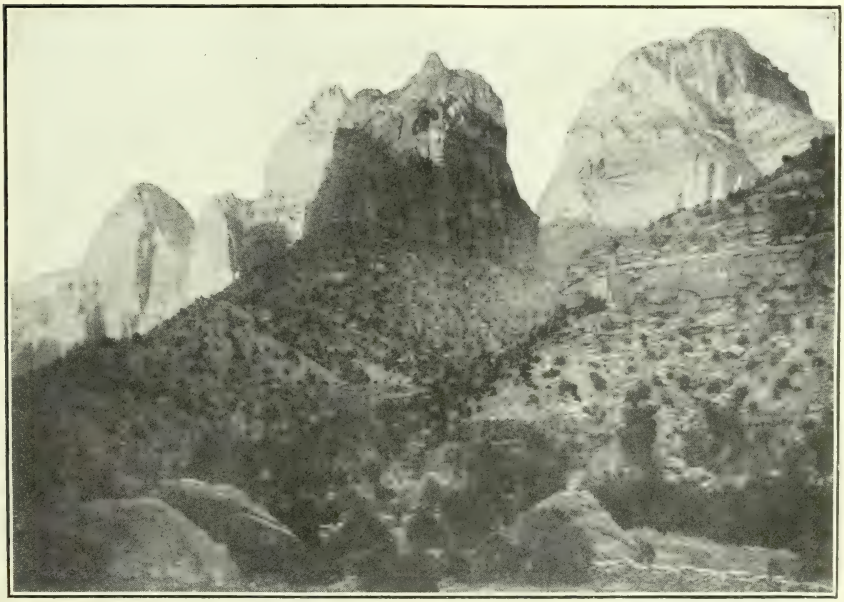
MESA VERDE NATIONAL PARK.

FAR VIEW HOUSE FROM THE SOUTH.

This mesa pueblo was excavated in 1916. It is one of the Mummy Lake group of ruins.

MOUNT McKINLEY NATIONAL PARK.

Mount McKinley, 20,300 feet above the sea.



Photograph by R. D. Adams.

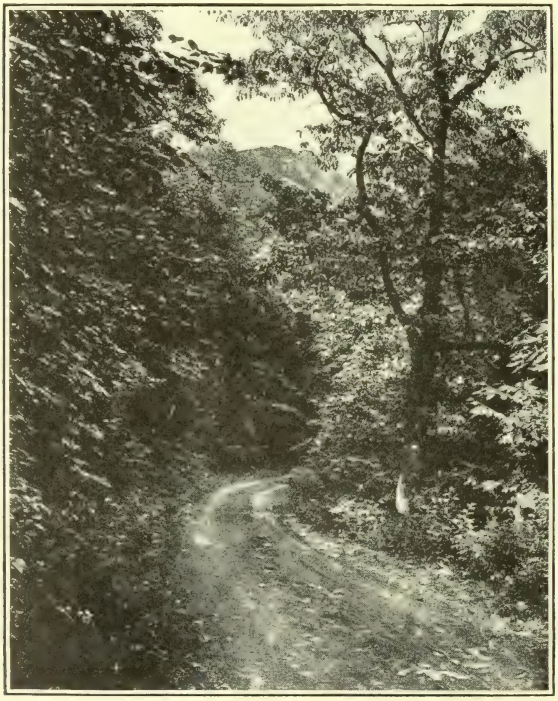
MUKUNTUWEAP NATIONAL MONUMENT.

Scene in Zion Canyon, showing the beautiful East Temple of the Virgin.

From National Geographic Magazine, Washington, D. C., Copyright, 1916.

SIEUR DE MONTS NATIONAL MONUMENT.

Vista of the sea from Newport Mountain.



PROPOSED GRANDFATHER MOUNTAIN NATIONAL PARK, NORTH CAROLINA.

Yonahlossee Road along the side of Grandfather Mountain.

DISCOVERY OF FAR-VIEW HOUSE.

The cliff dwellings are not all that remain of the ancient civilization that the park contains. Dr. J. Walter Fewkes, of the Smithsonian Institution, uncovered the wonderful Sun Temple on the top of the mesa, not far from Cliff Palace, in 1915, and last year, in the Mummy Lake group of mounds, he unearthed and restored Far-View House, a splendid mesa pueblo of enormous size. A picture of this ruin and a model of its structure are contained in this report. It can not be described here, but Dr. Fewkes has recently published a full report on his excavation of Mummy Lake and has fully explained the features of Far-View House.

BIG RESULTS FOR LITTLE MONEY.

The excavating that has been done in Mesa Verde Park has been accomplished on a very small scale. Dr. Fewkes, with small allotments of funds made only occasionally, has accomplished an unbelievable amount of invaluable archæological work. First, he explored and excavated several of the larger cliff dwellings, then he devoted himself to the pueblo ruins, with the result that we now have Sun Temple and Far-View House added to the long list of the Mesa Verde's accessible prehistoric structures. Much more archæological work should be done.

A few thousand dollars a year would make possible the early excavation of the other mounds at Mummy Lake, and within a comparatively short time a great group of cities of the past could be cleared out and restored. Funds should also be provided for further archæological work among the cliff dwellings.

The wonderful Peabody House should be restored at once. Its great four-story tower, one of the most interesting features of the Mesa Verde cliff dwellings, is in danger of toppling over, and there are other unique features of this structure which demand immediate attention. This cliff dwelling has kivas or ceremonial chambers that are still covered with the original roofs of cedar poles, installed, of course, hundreds of years ago, just how far in the past no one knows. This cliff dwelling is not easily reached at the present time, and it is not proposed to build a good trail to it until the needed work of restoration has been completed.

MESA VERDE'S TWO GREAT NEEDS.

Funds for the excavation of more pueblos and for cliff dwelling repairs constitute one of Mesa Verde's two greatest needs. The other is a new road ascending the mesa. The existing road around Point Lookout is not satisfactory. In rainy weather it is impassable, and rocks and débris from the mountain above are constantly sliding into the middle of the road. Engineers state that it will never be possible to prevent blocking of the road by débris, and that as long as it is used the cost of maintaining the park road system will be high, but by building a new road eliminating this ascent to Point Lookout, the present cost of maintaining the Mesa Verde road system can be cut at least one-half, and perhaps three-fourths of the maintenance expense can be eliminated. The entire road system of the park, with the exception of the Point Lookout road, is in excellent condition. It is very easy to maintain.

There was an increase of 100 per cent in travel to Mesa Verde during the 1916 season, when 1,385 people toured the park, and reports for this year indicate that this figure has almost doubled during the season just closed. Prior to October 12, 7,223 registered in the park. There was a large increase in automobile travel; 364 cars entered the park during this season, as against 185 last year.[1]

Very good accommodations for travelers in the park have been maintained during the season at Spruce Tree Camp, and next year these accommodations will be considerably enlarged and many new improvements will be made in the camp establishment.

The National Park Service will construct an automobile shelter and free camp for motorists and will establish in a new structure, originally built for a ranger station, a museum and gallery of pictures of the park. All relics of the cliff dwellings and pueblo ruins now in the park and those that may hereafter be accumulated will be installed in this museum. The museum building has a broad veranda, where visitors may sit and contemplate the beauties of Spruce Tree House in the cliff on the other side of Navajo Canyon. In this building Dr. Fewkes may lecture to the visiting public on the history of the Mesa Verde and on his archæological work in the park—provided, of course, that the continuation of his work is authorized.

SCHOOL OF ARCHÆOLOGY BOUND TO COME.

Sometime in the future there may be a school of archæology in Mesa Verde Park, where students may gather from all of our great colleges for a study of the institutions, customs, and characteristics of the vanished race that once inhabited the park. As the National Park Service encourages the use of the parks by students of the natural sciences, so does it invite students of archæology, anthropology, and related sciences to foregather in the Mesa Verde and its monuments of the Southwest, where the remains of a past civilization are preserved.

Ultimately there may be other parks like Mesa Verde established in the Southwest, and certainly there are other cliff dwellings and prehistoric structures that should be preserved under the monuments act. The National Park of the Cliff Cities, including the Bandelier Monument, is already projected.[2] Investigations have been made during the summer that will doubtless disclose ruins that should be included in the national monuments by presidential proclamation.

It is very easy to visit other interesting points in the Southwest from Mesa Verde Park. It is only a short trip to Taos in one direction and to the land of the Moquis and Navajos in another direction. In the Navajo Reservation there is a national monument, the improvements of which will be described in another part of this report, and down in New Mexico there are the ruins of Chaco Canyon Monument that are administered by the Interior Department, and those of Bandelier and Gila Cliff Dwellings Monuments under the Agricultural Department.

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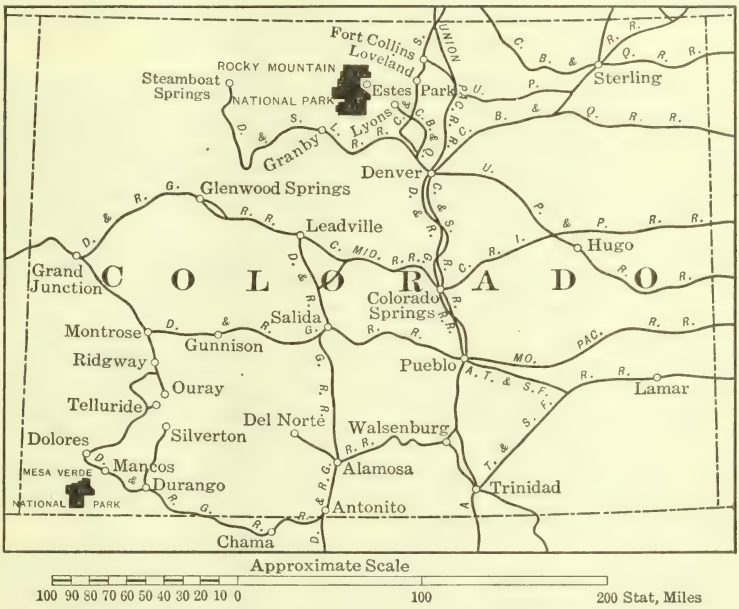
[1] See map showing position of Yellowstone, Glacier, Rocky Mountain, and Mesa Verde National Parks, and Mukuntuweap National Monument, with principal connecting roads, p. 870.

[2] See p. 876.

Mesa Verde National Park may be reached from Salt Lake City, Utah, from Denver and other points in Colorado, and from Santa Fe, N. Mex., via the lines of the Denver & Rio Grande Railroad. These lines traverse some of the finest scenery of the Rocky Mountains.

A CHOICE OF SCENIC ROUTES.

If what is known as the "Round the Circle" tour is taken from Denver, the Mesa Verde traveler may enjoy the trip through two great gorges with walls nearly 3,000 feet in height and along the rim of another gorge 3,000 feet deep, and he may ride over three passes, the altitudes of which are over 10,000 feet. The gorges are



MAP SHOWING RAILROAD ROUTES TO ROCKY MOUNTAIN AND MESA VERDE NATIONAL PARKS.

the Royal Gorge of the Arkansas River, the Black Canyon of the Gunnison, and the Toltec Gorge of the Los Pinos; and the three passes, the Marshall Pass, 10,856 feet, Lizard Head Pass, 10,250 feet, and Cumbres Pass, 10,015 feet. If the trip is made from Salt Lake, the pass at Soldier Summit in the Wasatch Mountains is of great interest to the traveler, as it affords splendid panorama of Utah's great central valley.

But the deep gorges and high passes to be seen and enjoyed on the railroad trip to Mesa Verde are only a few of the features of the circle tour. The fertile valley of the Uncompahgre River is traversed and from the train one may view some of the works of the Uncompahgre reclamation project. Other beautiful valleys which the railroad passes through are those of the San Miguel, Dolores, and San Luis Rivers, and from Durango a side trip may be made up the beautiful Las Animas Valley. In either direction one must spend a night in the Colorado Rockies on his way to the park.

If the trip is made via Marshall Pass and the Black Canyon of the Gunnison from Denver, or via Soldier Summit and Grand Junction (Colorado National Monument near here) from Salt Lake City, a night is spent in the picturesque mining town of Telluride, where the Rockies tower high above the village and its great mills. If the trip is made in the other direction, via Alamosa, Cumbres Pass, and the Toltec Gorge, the night is spent in Durango.

There is scenery everywhere along the line, and if Pullman sleepers were provided for the traveler he would miss much that he should see. Sleepers, of course, are provided from Denver and Salt Lake City to the junction points of the broadgauge lines of the Denver & Rio Grande, with its narrow gauge at Alamosa, Salida, and Montrose.

HOT SPRINGS RESERVATION, ARK.

The 1917 season marks the beginning of a new era for Hot Springs Reservation, Ark. In the sundry civil bill of June 12, 1917, Congress authorized the use of $10,000 of the revenues of the reservation for the preparation of a general plan of development, including the landscape improvement of the park and a new Government free bathhouse. The contract for the preparation of this comprehensive improvement scheme was awarded to the firm of Mann & Stern, architects, of Little Rock, Ark., who have designed and constructed several of the splendid new bathhouses on the reservation front.

Preliminary plans that have already been submitted to the department indicate that a solution of the landscape problem involved has been found and the perplexing question of where the new Government bathhouse shall be located has also been solved. Studies for the new free bathhouse have already been submitted and a design selected, and an estimate for an appropriation for the construction of the new bathhouse will be submitted at once for the consideration of Congress at its next session.

It is expected that the complete plan for the entire improvement of the park will be ready for submission to Congress a year hence. When this comprehensive scheme for the development of Hot Springs shall have been carried to completion, this great park and its health-restoring waters should take a place among the finest spas of the Old World.

During the past year approximately 135,000 people visited Hot Springs. This is the largest patronage that it has enjoyed in recent years. It is expected, however, that the number of visitors during the coming season will exceed that of all previous years.

Among this great throng of visitors there are, of course, thousands of indigent sick who swarm into the city, and many of them soon require the attention of the charitable institutions of the community. I venture the opinion that there are few towns in the United States where there is so much charitable work required and so few to shoulder the burden. The attitude of Congress toward the development of the reservation, particularly in connection with projects involving work in the city as well as on the reservation, should be guided largely by what this community does for the suffering humanity that it finds each year within its gates and ministers to through its charities and civic associations.

The operation of the free clinic by public-spirited doctors of the city is another example of what the Hot Springs people are doing for the poor and sick within their gates. The work of the free clinic has been continued throughout the year with very satisfactory results. The cases treated, with a full analysis of their reports, will be found on page 893 of the report of the supervisor of the reservation.

During the past year a relentless war has been waged on the drumming evil, with the result that 14 doctors have been stricken from the list of registered physicians and 17 drumming hotels were punished by having their guests denied the baths of the park so long as these individuals patronized their establishments. The beneficial results of the elimination of the drumming evil can hardly be estimated.

HAWAII NATIONAL PARK.

The act of Congress approved August 1, 1916,[1] created the Hawaii National Park from lands on the islands of Hawaii and Maui, in the Territory of Hawaii. This reservation includes four tracts of land totaling 75,295 acres, within which are located two of the most famous active volcanoes in the world, Mauna Loa and Kilauea, and another volcano Haleakala, which erupted less than 200 years ago, in addition to the wonderful lava lake, a mass of fire 1,000 feet in diameter.

The Hawaiian volcanoes are wholly unique of their kind, the most famous in the world of science, and the most continuously, variously, and harmlessly active volcanoes on earth. Kilauea crater has been nearly continuously active with a lake or lakes of molten lava for a century. Mauna Loa is the largest active volcano and mountain mass in the world, with eruptions about once a decade, and has poured out more lava during the last century than any other volcano. Haleakala is a mountain mass 10,000 feet high with a tremendous crater in its summit 8 miles in diameter and 3,000 feet deep, with many high lava cones built up inside the crater. It is probably the largest of all known craters among volcanoes that are technically known as active.

In view of the provision in the act creating the park that no appropriations shall be made until conveyance is effected of such perpetual rights of way over private lands within the exterior boundaries of the park as the Secretary of the Interior shall find necessary to make it reasonably accessible in all its parts, the matter of obtaining definite information as to conveyance of these rights of way has been taken up with the Governor of the Territory and with the Commissioner of Public Lands. Assurances have been obtained that needed rights of way will be granted within the Haleakala tract, and within the crater itself there will be no difficulty in obtaining camp and building sites, rights of way for trails, etc.

All of the private holdings within the Mauna Loa tract, so-called because it includes the very summit of the mountain, Mauna Loa, with its crater, Mokuaweoweo, will probably be conveyed to the Government within a short time. These lands will be donated by their owners.

[1] 39 Stat., 432.

It is expected also that arrangements will be made shortly for the transfer of the Kilauea Crater to the Government. Some readjustments of boundaries of the Kilauea tract remain to be effected. An estimate has been submitted to Congress for the appropriation of funds to continue negotiations with reference to the adjustment of private holdings and the securing of rights of way, conditions precedent to the further development of the park under the organic act.

The National Park Service should assume active control of the Hawaii Park areas as soon as possible. Travelers to the park are becoming more numerous each year, and acts of vandalism are daily occurring and may be expected to increase. Questions may be asked as to how volcanoes and their surrounding regions may be injured in any manner, and doubt may be expressed as to the necessity for protecting a volcanic park. The fact is there are many volcanic formations that are as susceptible to injury as the formations of Yellowstone Park. There are caves in the crater of Kilauea, for instance, where the lava in cooling has produced wonderful formations which might be termed stalactites and stalagmites. These beautiful formations will be entirely ruined unless they are protected from the unthinking travelers who delight in throwing bottles at them. The lava is exceedingly brittle and delicate, breaking very easily, and it is a source of amusement to tourists possessing vanadalistic propensities to strike them with bottles and watch them shatter.

In the crater of Haleakala the beautiful silver sword plant grows. Tourists are in the habit of pulling up these plants and taking quantities of them away as souvenirs. This plant grows no place else in the world, and if a measure of protection is not given to it in the Hawaii Park it will soon become extinct.

Furthermore, the beauty of the floor of the Kilauea Crater to a considerable extent is lost because it is impossible to compel the traveling public to clean up the camp and picnic grounds.

There is an inhibition of $10,000 on the appropriation for the park, but at least this amount should be provided for protective purposes after the conditions precedent to an initial appropriation have been fulfilled, until such time as Congress considers it advisable to proceed with the general development of the park in the public interest.

WIND CAVE NATIONAL PARK.

Wind Cave National Park in South Dakota, like most other members of the system, has enjoyed an increase in patronage this year. The increase in automobile traffic was especially notable. Considerable work was done during the year in improving facilities for exploring the cave.

Other general improvements have been made, but the most important need of the park has not yet been met. This requirement is an adequate lighting system for the cave. A limited amount of funds is available for the installation of a lighting system, but up to the present time it has been impossible to find an adequate plant that could be purchased with the amount available.

Improvement in the wild animal preserve of the park under the direction of the United States Biological Survey has been progressing very satisfactorily. Several animals were brought to the park for

addition to the herds during the past year. The wild animals are securely inclosed by fences and visitors have no difficulty in seeing them. They constitute the attraction second only in importance to Wind Cave itself. Ultimately this park will become one of the most important wild animal sanctuaries of the United States.

PLATT NATIONAL PARK.

Platt National Park in Oklahoma has been visited by more people this season than ever before. It is estimated that approximately 35,000 persons visited the park during the year, but of course it is impossible to state how accurate this estimate is. It is not feasible to actually count every person entering the park nor is there any way to determine the number of parties who entered the park more than once in the course of the year. It is a fact that the popularity of the park is growing rapidly and that people are coming from long distances to enjoy the cool atmosphere and drink the medicinal waters. A large quantity of water from the medicinal springs has been shipped from the reservation during the year under departmental concession.

The roads and trails of the park have been improved and a small swimming pool has been constructed on one of the streams for public use. Much additional improvement is needed, and ultimately it may be advisable to construct a bathhouse in order that a larger use of the mineral waters may be had. This project will be given consideration during next year, as well as other plans for the betterment of the park.

The park is easily reached by train, and it is also accessible to the motorist. The roads in the park are few, but they are all well improved and they reach the most beautiful sections of the reservation.

SULLYS HILL NATIONAL PARK.

Sullys Hill National Park is being developed as a wild animal preserve under the general direction of the Biological Survey. Under appropriations made by Congress, the work of fencing and improving the park is progressing rapidly, and already several species of animals have been liberated in the park.

CASA GRANDE RUIN.

Little improvement work was done in Casa Grande Ruin during the past year because of lack of funds. At the request of this service, however, the Commissioner of the General Land Office had the roof of the custodian's house, which was blown off during a severe storm, replaced and also had some improvement work done on an old well which was sunk many years ago. The expense of these improvements was charged to the appropriation for protecting the public lands.

The walls of the well have again caved in and it is now in bad condition. It is, therefore, recommended that a new well be drilled a short distance west of the present one. The pump and engine installed by the General Land Office in connection with its improvement work last year could be moved to the new well.

At present the Ruin is unprotected from incursions of stray cattle, and a fence is badly needed. It is estimated that such a fence would cost $1,500.

THE APACHE TRAIL.[1]

In connection with the Casa Grande Ruin mention should be made of the "Apache Trail," which the Southern Pacific Railway is promoting in southern Arizona. The Apache Trail tour involves a side trip from the main line of the Southern Pacific, the "Sunset Route," from either Maricopa or Bowie, dependent upon whether the traveler is going east or west.

From east to west the trip is made as follows: Cars carrying parties holding tickets for the Apache Trail trip are sent from Bowie over the Arizona Eastern Railroad to Globe. Here connection is made with an automobile transportation line for the famous Roosevelt Dam of the Salt River reclamation project, 45 miles distant. At the Roosevelt Dam the railroad maintains a hotel. The present establishment has recently been renovated, but it will shortly be replaced by a new structure of imposing proportions, which will embody the principles of the architecture of the Southwest. Ordinarily the tourist remains overnight at the Roosevelt Dam, proceeding to Phoenix the next day by way of the Canyon of the Salt River, a ride of 75 miles through a very scenic region. At Phoenix the sleeper is taken for the continuation of the westward journey. The Tonto National Monument, with its well-preserved cliff dwellings, is near the Roosevelt Dam.

In connection with the trip over the Apache Trail it is possible with small changes in plans to visit Casa Grande Ruin and the Papago Saguaro National Monument, with its many varieties of cacti and other desert plants. The Papago Saguaro Monument is near Tempe, Ariz. The trip to the Casa Grande Ruin can also be made from the town of Florence and from Casa Grande station on the main line of the Southern Pacific Railway. The route to the Ruin by Florence is a little shorter than by way of the station at Casa Grande.

MOUNT M'KINLEY NATIONAL PARK.[2]

This new reservation, which incloses an area of 2,200 square miles, lies in south-central Alaska and contains the loftiest mountain in America—Mount McKinley. It was established by the act of Congress approved February 26, 1917,[3] and is the second largest national park.

Mount McKinley[4] rises 20,300 feet above sea level and is nearly 6,000 feet higher than Mount Whitney, the loftiest summit within the borders of the United States proper. The south side of Mount McKinley, which is the stupendous climax of the great Alaskan range, is nearly impassable. It is covered by glaciers of enormous bulk. The annual snowfall in some places reaches a depth of 60 feet. On the north side, however, is a rolling country dotted with beautiful lakes and forests and inhabited by great herds of caribou, bighorn

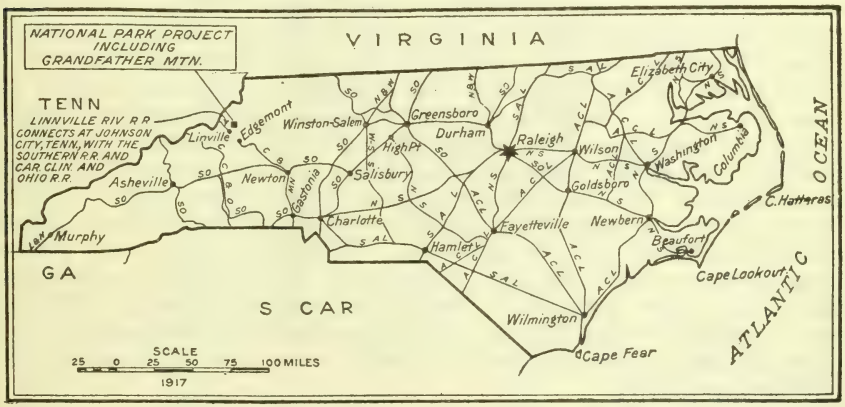
[1] See map opposite p. 880.
[2] See bibliography of publications on the Mount McKinley region, p. 1031.
[3] See p. 1010 for text of organic act.
[4] See picture of Mount McKinley in this report.

sheep, moose, and deer. The huge Alaskan bear is also native to the park.

Congress established this reservation as a refuge and breeding ground for conservation of Alaskan big game against inroads which may be expected to develop upon completion of the new Alaskan Railway. In the absence of specific appropriation for administration of the park the governor of Alaska continues to afford protection to the animal life through the small force of Territorial game wardens under his direction. Promptly upon passage of the act creating the park an estimate for an appropriation in the sum of $10,000 for protective and improvement purposes was submitted to Congress, but this failed to receive favorable consideration in either the Sixty-fourth or the Sixty-fifth Congresses. The estimate has been again submitted in the regular estimates for the 1919 fiscal year.

FIRST NATIONAL PARK EAST OF THE MISSISSIPPI.

Within a short time there will be a national park established in the southern Appalachian Mountains under the authority contained in the sundry civil act approved June 12, 1917.[1] Doubtless the new park will be called Grandfather Mountain National Park, because the famous peak that will form its center has long been known as the "Grandfather." The tract will be donated to the Federal Govern-



PRINCIPAL RAILROADS IN NORTH CAROLINA AND LOCATION OF PROPOSED GRANDFATHER MOUNTAIN NATIONAL PARK.

ment by public-spirited citizens of North Carolina and will be a very valuable addition to our national playground system. The service will publish a detailed description of the area, with full data as to its location, means of access, etc., as soon as the transfer of the property has been completed.

Grandfather Mountain was said by the early settlers to have received its name because it was supposed to be the highest mountain in the East when measured from its base in the Johns River Valley to the peak. While it does not rise to as great a height as Mount Mitchell, the base of its eastern slope is probably a thousand feet lower than the base of Mount Mitchell. Taking in consideration its

[1] See p. 1012.

height, ruggedness, beauty of scenery, and the forests which surround it, the mountain is most striking and impressive. The Grandfather is the highest mountain in the Blue Ridge Range. It appears that all higher peaks are in spurs of the Blue Ridge. The ridge approaches one side of Grandfather Mountain from the southwest at an elevation of about 4,500 feet, and seems to run under the mountain and leave the other side, going northwest at about the same elevation. The mountain is said to be the center of more river systems than any other peak. The East and West Forks of the Linville River, the North Toe River, the South and East Forks of the Watauga River, and Wilson Creek, which runs into the Catawba, all have headwaters on the slopes of Grandfather Mountain; and the headwaters of the Yadkin River are not far distant. The mountain is covered with a growth of hardwood and in the park area of 1,400 acres the growth is largely spruce, fir, and balsam. There has been considerable road and trail improvement accomplished already and the area will be accessible to visitors as soon as it is dedicated for park purposes.

MUKUNTUWEAP NATIONAL MONUMENT (ZION CANYON).

During the past year considerable attention has been directed toward the exploration and improvement of Mukuntuweap National Monument in southern Utah. This monument embraces the beautiful canyon of Zion Creek (a branch of the Virgin River) a gorge that ranks with the finest canyons of the park system. In some respects it resembles the Yosemite Valley and in others the Grand Canyon of the Colorado River. There are domes and spires in the canyon, as there are in the Yosemite, but the Zion Canyon formations[1] were carved, we are told by geologists, through water erosion, while the Yosemite was chiseled out by ice. The walls are perpendicular, as in the case of the Yosemite gorge, but they are not quite so high. On the other hand, they are colored as brilliantly as are the terraces of the Grand Canyon of the Colorado. The height of the walls varies from 2,500 to 3,000 feet and occasionally a magnificent mountain, such as the West Temple of the Virgin, rises more than 3,000 feet above the floor of the canyon. The monument includes most of this gorge, although its extension northward is not reserved and has not even been explored.

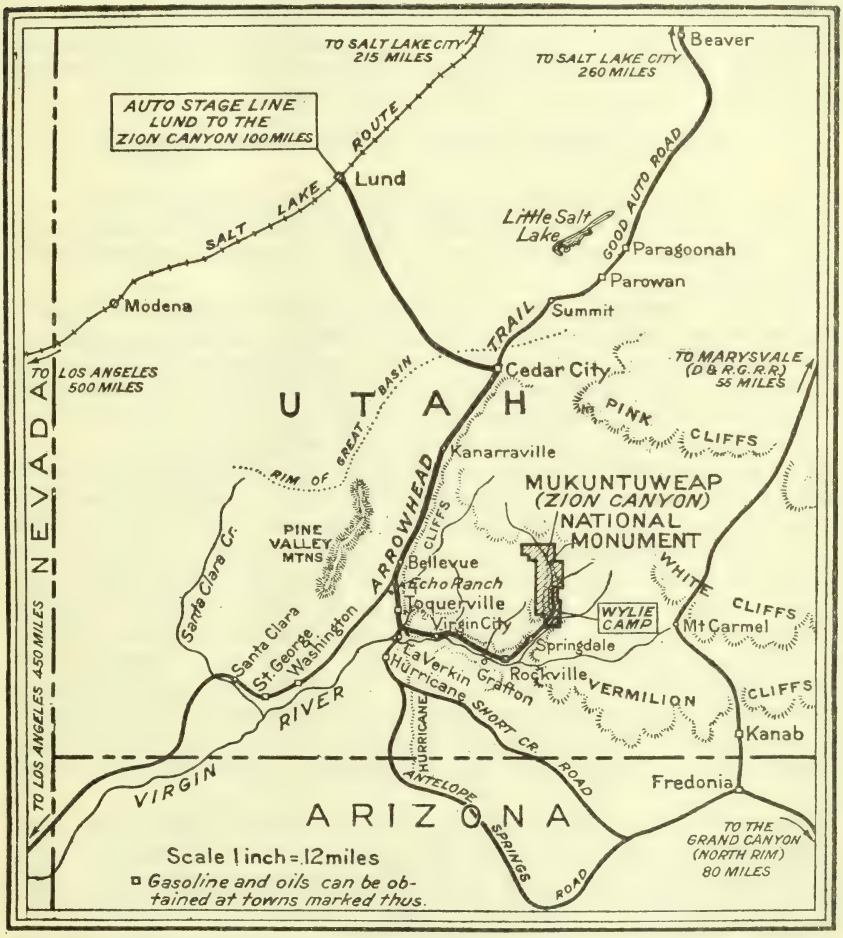
The monument is little known by its Indian name, Mukuntuweap, but is generally called Zion Canyon, the name given to it years ago by the Mormon pioneers.

The monument is reached from Lund, Utah, on the Salt Lake Route, via the Utah State highway to the little village of Springdale at the mouth of Zion Canyon. This village is nearly 100 miles from the railroad, but the entire route is through a surpassingly beautiful region.

Besides its scenic qualities it possesses historic associations and geologic formations that are extremely interesting. For instance, the State highway proceeds for several miles along the Hurricane Cliffs formed by the great Hurricane Fault and through the outlet of the great Lake Bonneville, so important in the geologic history of the

[1] See picture of East Temple of the Virgin, in Zion Canyon, which is reproduced in this report.

United States. Again, the road takes its course through the site of old Fort Hamilton, where the Mormons built a stockade more than a half century ago for protection against the Indians, and through several other very interesting historic settlements. The history of the Mormon settlements in southern Utah and the life in the thrifty Mormon communities in "Dixie," as this country is generally known,



Map Showing Position of Mukuntuweap National Monument in Southern Utah, With Connecting Roads.

which one hears about and observes on a trip to Zion Canyon, make the journey inexpressibly delightful.

During the past year the department granted to Mr. W. W. Wylie, formerly of the Wylie Camping Co., in Yellowstone Park, and his associates a five-year concession to maintain and operate a permanent camp in Zion Canyon and a transportation line from Lund, Utah, to this canyon. An excellent camp was established in one of the most beautiful spots in the gorge and is operated throughout the summer; in fact it is still open for auto travel.

Over 300 people visited the canyon during the season. This travel is considered remarkable when attention is given to the fact that this is the first year that the monument has been accessible. The transportation line from the railroad to the canyon has been excellently managed.

Plans for the complete development of this monument as an important tourist resort are now under way. Under an appropriation of $15,000 several miles of new automobile highway were constructed during the spring of this year. Next year this road and others in the monument will be further improved and trails to side-trip destinations from the Wylie Camp will be constructed.

SIEUR DE MONTS NATIONAL MONUMENT, MAINE.

Sieur de Monts National Monument, on Mount Desert Island, near Bar Harbor, is the only national monument east of the Mississippi River. It is estimated that it was visited this year by approximately 53,750 people.

Custodian George B. Dorr reports that a large amount of improvement work was accomplished in the monument during the past year. Approximately all of this work was accomplished by Mr. Dorr and his associates through the contribution of their private funds and the expenditure of much personal effort on the part of several of these gentlemen, who have a very high ideal of public service.

It will be recalled that the Sieur de Monts Monument was originally donated to the Federal Government by a group of New England citizens. These same gentlemen are now arranging to donate to the Federal Government a tract of land which will nearly double its present area. This new territory includes the mountains to the west of Somes Sound, which divides Mount Desert Island into two nearly equal sections. The enlargement of the monument will also give it a mile of frontage on the sea, with excellent opportunities for the establishment of boat landings. Furthermore, the enlargement will bring into the monument the site of the famous French missionary colony of 1613, a most historic spot, with land connecting it directly with the mountains and with ample opportunity for wharfage.

During the year a mile and a half of level path in the Otter Creek Gorge was constructed. A new path was also constructed to the summit of Dry Mountain. Rock construction is mainly involved in this latter piece of work, which covers a distance of about a mile and a quarter; the height ascended is 1,200 feet.

During the year the State of Maine and the town of Bar Harbor have jointly expended approximately $12,500 on the principal road through the monument. Other important road construction completed during the year includes the important approach road on the Seal Harbor side of the monument, work that has cost in excess of $8,000. Road work initiated and partially completed includes new construction work on the Bar Harbor approach. No Federal funds were expended in any of these improvements.

Forest clearing in the Eliot and Beaverdam Pool woods as a means of preventing fires was undertaken and completed during the year.

Two rangers were employed during the summer to protect the forests, birds, and wild animals. These rangers are paid a very

nominal salary by the Government. Contributions by the gentlemen who are interested in the promotion and development of the monument provided the bulk of the funds for this protective work.

A series of publications on the monument was issued during the year, list of which will be found on page 1035. With the cooperation of the Boston & Maine Railroad an edition of 42,000 booklets on the Sieur de Monts Monument and the White Mountain National Forest was issued for free distribution to the public. These publications have stimulated a tremendous interest in the monument, and have had the effect of inducing much travel to the reservation.

This beautiful park is bound to grow in importance as a national playground, and its development should receive the early consideration of Congress.

MUIR WOODS NATIONAL MONUMENT, CAL.

Muir Woods National Monument, in California, on account of its close proximity to San Francisco was naturally visited by a large number of people. It is estimated that approximately 26,000 people visited the park during the year, of which number approximately 6,000 entered in automobiles. The monument is visited by the majority of those who ride to the summit of Mount Tamalpais on the Mount Tamalpais & Muir Woods Railroad, the crookedest railroad in the world. It is a delightful trip to leave San Francisco in the morning, go over to Sausalito on the ferryboat, thence to Mill Valley by electric train, and there take the sight-seeing train to the top of Mount Tamalpais, where a marvelous view of the Pacific Ocean, San Francisco Bay and all of the region surrounding the bay may be had. The return trip is made by gravity car to the Muir Woods, thence back to Mill Valley and San Francisco by train and ferryboat. Visitors to Mount Tamalpais and Muir Woods come from all over the United States; in fact, a very large majority of people who visit these places each year are from outside of the State of California.

The trees in the Muir Woods are sequoia sempervirens, a species of redwood that grows in the Coast Range Mountains of California; sequoia washingtoniana or gigantea grow in the Sierra Nevada and in no other place in the world. The grove was donated to the Nation by Hon. William Kent and Mrs. Kent in 1908.

During the year the fire lanes and trails of the Muir Woods Monument were cleared out and are now in excellent condition. The road within the monument, however, is badly in need of graveling; several small footbridges also are needed, and a system of signs for the information of travelers in the monument should be installed.

A special assistant has been assigned to aid the custodian in caring for the park on Sundays and holidays during the summer season.

RUINS IN NAVAJO MONUMENT, ARIZ., RESTORED.

In the Indian appropriation act of May 18, 1916, $3,000 was made available for the preservation and repair of the prehistoric pueblo ruins and cliff dwellings comprising the Navajo National Monument, Ariz., and Neil M. Judd of the United States National Museum was detailed by the Smithsonian Institution as field officer in charge of this work. Mr. Judd proceeded to the Navajo Indian

Reservation in March and directed his attention solely to the restoration of Betatakin (Hill-side House), a remarkable cliff village which was rapidly falling into hopeless ruin. Owing to extremely unseasonable weather conditions and to the difficulty of securing laborers or even sufficient provisions for the small force engaged, the repair of this single large ruin was not completed before the appropriation lapsed, a few rooms being left in a fallen state. The rebuilt portion of the pueblo, however, will afford a fairly correct and lasting impression of the original appearance of Betatakin and assist the visitor in picturing the daily life and activities of its picturesque builders.

During the work of restoration every effort was made to retain the aboriginal "atmosphere" of the place and to eliminate, as far as possible, all evidence of the white man's handiwork. Mud instead of cement was employed in reconstructing masonry walls; willows and leaves of the yucca plant were utilized in repairing walls of wattle construction. Shallow steps, pecked with stone hammers into the sloping floor of the cave and leading from one section of the ruin to another, were enlarged to furnish a safe footing for modern visitors. Ladders made from the trunks of cedar trees, with branches or notches for steps, and pole ladders, with rundles bound by willows and yucca-leaf withes, were placed at certain walls as a means of ready access to the housetops. Fallen roofs were replaced and retaining walls were rebuilt, but always with the materials an aborigine would have utilized in similar tasks.

A few weeks' additional work is yet needed before Betatakin is entirely ready for the many visitors, who will find both pleasure and inspiration among its abandoned rooms. Kitsiel (Broken-pottery House) and several lesser cliff villages near Betatakin should also be excavated and restored; Inscription House, a prehistoric dwelling included within the Navajo National Monument, but some distance from the other ruins, is one of the most important of the northern Arizona cliff houses and deserves especial consideration in future efforts at restoration. In this ancient pueblo is the unprotected inscription of an early Spanish explorer, an inscription made during the latter part of the seventeenth century, a hundred years before the Spaniards were supposed to have penetrated the desert west of the Hopi villages. That Inscription House should be speedily and properly restored is obvious to all students of our great Southwest and to all Americans who find pleasure in tracing the history and development of their country.

EL MORRO NATIONAL MONUMENT, N. MEX.

El Morro National Monument includes the historic El Morro Inscription Rock, approximately 40 miles from Thoreau, N. Mex., and 55 miles from Gallup, N. Mex. Both Thoreau and Gallup are on the Atchison, Topeka & Santa Fe line.

During the year arrangements were made with Mr. Evon Z. Vogt, of Ramah, N. Mex., to assume the custodianship of the monument and to supervise its improvement. Under his direction a substantial fence $1\frac{3}{8}$ miles long has been built at the base of Inscription Rock for protection of the famous Spanish inscriptions against depredations; a fence for visitors' stock has also been constructed.

In order to secure an ample supply of water, the spring at the base of the rock has been cleared out and the water impounded. This improvement is a very important one because the monument is located in a semiarid region. The monument was enlarged by presidential proclamation of June 17, 1917, to include two quarter sections of land west of Inscription Rock. Within a canyon dividing the western formation there are several large communal houses built by the aboriginal inhabitants of the region.[1]

MONTEZUMA CASTLE NATIONAL MONUMENT, ARIZ.

This monument which embraces the splendid cliff dwelling known as Montezuma's Castle is built in the form of a crescent in a niche in the face of a vertical cliff 175 feet in height. The floor of this niche is approximately 80 feet above the base of the cliff. During the year the National Park Service entered into a contract with Mr. Alston D. Morse covering a general renovation of the Castle. Considerable progress has already been made in this work. New and substantial ladders have already been installed to render safe and convenient access to the ruin. Rubbish will be removed from the structure, the walls will be strengthened, and floors will be supported by posts and beams. These improvements will make the monument accessible to visitors. It is our purpose to appoint a custodian to care for the ruins and prevent active vandalism.

This monument is reached by automobile from Prescott on the Santa Fe system or else it can be reached from Jerome, Ariz., on a branch line of the Santa Fe, a town some 27 miles from the monument; Prescott is 54 miles distant.

CHACO CANYON NATIONAL MONUMENT, N. MEX.

Data on the work of excavation of ruins in the Chaco Canyon National Monument have not been received as yet. The exploration and excavation work that has been undertaken in this monument in the past has been under the auspices of museums and other institutions interested in the preservation of the structures of the early civilization of the Southwest. The Royal Ontario University of Toronto and the School of American Research at Santa Fe have made arrangements to conduct archaeological work in the monument, and a reconnaissance of the ruins has been made by Dr. E. L. Hewett, director of the School of American Research.

TUMACACORI AND GRAN QUIVIRA NATIONAL MONUMENTS.

The Tumacacori National Monument, in southern Arizona, includes the famous Tumacacori Mission, supposed to have been founded by Father Kino between 1687 and 1690. This mission and that of San Xavier del Bac, near Tucson, were Father Kino's two great missions. The latter is still in a splendid state of repair, but the former is in ruins, and unless steps are soon taken to protect its crumbling walls and tower it will be lost forever. Unfortunately the National Park Service can do nothing to improve the mission at the present time.

[1] See presidential proclamation, p. 1014.

It lies within the Luis Maria Baca Float property, title to which was confirmed to claimants thereof by the Supreme Court of the United States on November 2, 1914. The Service is making efforts at the present time to secure the conveyance of the mission property to the Government under the monuments act. If this conveyance is made, efforts will be made to repair the old mission and provision will be made for its future protection.

Recently five trespassers on the Gran Quivira National Monument, New Mexico, were caught digging for relics in the ruins of the old mission. They were arrested and upon entering pleas of guilty to defacing the monument were fined and liberated. The fines imposed totaled $246.

PETRIFIED FOREST NATIONAL MONUMENT, ARIZ.

In the Petrified Forest National Monument an elaborate steel reinforcement was placed under the great petrified tree trunk that lies across a small canyon in the First Forest. This tree, which has long been known as the Natural Bridge, has been in danger of sinking into the canyon, and it was exceedingly fortunate that we had sufficient funds available this year to build a support under it that will permanently protect it. This monument lies directly in the path of transcontinental travel through the Southwest and is visited by many thousand tourists in the course of the year. Its most attractive sections are not as accessible as they should be and development by the construction of roads is very badly needed. An estimate for appropriations to build roads in the monument has just been submitted. Mr. Chester B. Campbell, of Adamana, Ariz., is custodian of the monument.

PAPAGO SAGUARO NATIONAL MONUMENT, ARIZ.

Lack of funds prevented the undertaking of any improvement work in the Papago Saguaro National Monument. This monument should be fenced in order to prevent the incursions of straying cattle.

The monument contains many species of cactus and other desert plants.

As I have already explained, it is located near Tempe, Ariz., but it is easily reached from Phoenix and other points in the Salt River Valley. Trips to it can be made in connection with the Apache Trail tour of the Southern Pacific Railway.

COLORADO NATIONAL MONUMENT, COLO.

The custodian of the Colorado National Monument, Mr. John Otto, reports that visitors to the monument during the year numbered approximately 3,500.

No Federal funds have been used in the improvement of the monument, but the custodian reports that much has been accomplished through the public-spirited efforts of the communities near the reservation. The county also made some improvements at the entrance to the monument. A large part of the reserved area has also been fenced with a view to making it available for use as a wild-animal preserve. Much of this work has been done by Custodian Otto him-

self. He has also kept the trails of the monument in an excellent state of repair.

Colorado National Monument is reached from Grand Junction. This city is on the main line of the Denver & Rio Grande Railroad. It includes in its boundaries many highly colored monoliths, splendid examples of the powerful effects of wind and water erosion. Some of these monoliths are over 400 feet high and 100 feet in diameter at the base.

DEVILS TOWER NATIONAL MONUMENT, WYO.

In the Devils Tower National Monument the authorities of Crook County, Wyo., built over 3 miles of road on a grade not exceeding 8 per cent to reach the base of the tower. Heretofore this great formation has not been accessible except to the pedestrian or to the horseback rider. The new road has a width of from 12 to 16 feet and is well constructed. It should, however, be improved and made a permanent highway. The Federal Government should participate in the improvement of this road. An estimate has been submitted to Congress for an appropriation to cover the cost of half of this improvement.

SHOSHONE CAVERN NATIONAL MONUMENT, WYO.

This cavern is situated in the upper portion of the north face of Cedar Mountain, near Cody, Wyo., on the opposite side of the Shoshone River from the main automobile road to Yellowstone National Park. Ascent to the cavern is very difficult, and because it is so far removed from the Yellowstone road it is not often reached by visitors.

A trail was located along the side of the canyon and the construction of the lower portion was completed last November. The upper and more difficult portion remains to be constructed before convenient access to the cavern can be had.

LEWIS AND CLARK CAVERN NATIONAL MONUMENT, MONT.

The entrances to the Lewis and Clark Cavern have been closed to the traveling public during the past two seasons, but it is hoped that it will be possible to place a custodian in charge of the monument next year and open the cavern to visitors.

Arrangements are also being made for the construction of a road to the main cavern entrance.

There are two entrances to the cavern, both 1,300 feet above the railroad. The climb to them at the present time is a very difficult feat to perform. When an automobile road is constructed, the ascent will be easy, and many motorists who travel between Yellowstone and Glacier National Parks will stop to see this interesting work of nature.

There are four marvelous caverns in the national monument system, two of them under the National Park Service and two under the jurisdiction of the Department of Agriculture. Jewel Cave, in South Dakota, and the Oregon Caves, in Josephine County, Oreg., are the two under the Department of Agriculture. Should jurisdiction of all of the monuments be transferred to the National Park

Service, it would be desirable to issue a publication describing and differentiating the natural features of all of these caverns and perhaps others, such as Mammoth Cave, Luray Cavern, etc.

SITKA NATIONAL MONUMENT, ALASKA.

No effort has been made to improve the condition of the totem poles in the Sitka National Monument during the past year. It will require approximately $1,000 to do the work necessary to safeguard these relics, and an estimate for an appropriation of this amount has been submitted to Congress. Roads in the monument are in very good condition.

CAPULIN MOUNTAIN NATIONAL MONUMENT, N. MEX.

This monument, containing the crater of an extinct volcano, is now approached by very good roads. Mrs. W. H. Jack, of Folsom, N. Mex., its custodian, reports that during the past year there has been an unusually large number of visitors. No estimates of their number, however, have been made.

NATURAL BRIDGES, RAINBOW BRIDGE, DINOSAUR, AND PINNACLES NATIONAL MONUMENTS.

There is nothing of importance to report with reference to the administration, protection, or improvement of the following monuments: Natural Bridges, Rainbow Bridge, and Dinosaur National Monuments in Utah, and the Pinnacles National Monument in California.

A report submitted by Mr. F. Stanley Hinrichs, Chief of Field Division, General Land Office, after a trip to the Natural Bridges and the Rainbow Bridge in the autumn of 1916, states that the monuments, including these great natural bridges, are still quite inaccessible.

Mr. E. M. Newman, the lecturer, visited Rainbow Bridge National Monument in connection with his 1917 tour of the national parks and monuments.

There has been considerable local travel to the Pinnacles Monument, in San Benito County, Cal., but all visitors had to camp out in the monument, as there are no hotel or camp accommodations therein. It is hardly time to proceed with the general development of this monument, because it is not easily accessible.

VERENDRYE NATIONAL MONUMENT, N. DAK.

The latest national monument to be created is the Verendrye, in North Dakota, the proclamation for which was signed by the President on June 29, 1917.[1] This monument reserves for public use and enjoyment a commanding butte locally called Crowhigh Mountain, which stands close up to the left bank of the Missouri River in northwestern North Dakota. This butte is important historically because it was used by Verendrye, the French explorer of the Northwest, and his party, who started from the north shore of Lake Su-

[1] The President's proclamation is on p. 1015.

perior, passing westward into the unknown regions of the Great Plains and Rocky Mountains about 1740. Verendrye was the first known white man who entered the territory now included within the State of North Dakota. The butte was used as an observation station by this explorer, who crossed the Missouri River at this point, going thence westward as far as the Rocky Mountains.

THE GRAND CANYON SHOULD BE A NATIONAL PARK.

The Grand Canyon National Monument deserves mention again as the most important national park project pending at the present time. Its early dedication for park purposes can not be too strongly urged. The spectacle of this magnificent region embracing one of the recognized natural wonders of the world standing outside of a park system that now includes the most sublime scenic features of the earth is almost ridiculous. The public, generally, understand that the canyon is in a national park, and the volume of requests for information regarding it that the service receives in the course of a year is enormous. It should receive its rightful status as soon as legislation to this end can be enacted.

Senate bill No. 390, Sixty-fifth Congress, providing for the establishment of the Grand Canyon National Park, was introduced by Senator Ashurst, of Arizona, in April, 1917, and is now pending in the Senate Committee on Public Lands. Similar bills (S. No. 8250 and H. R. No. 20447) were introduced in the Sixty-fourth Congress, but failed of passage.

SECRETARY LANE'S OPINION.

In your report on S. 8250 and H. R. 20447, the following statement and recommendation was submitted for the consideration of the Public Lands Committees:[1]

The area proposed to be set aside and dedicated as a national park by this measure embraces approximately 996 square miles of public land now constituting part of the Kaibab and Tusayan National Forests, in northern Arizona. A large part of it also lies within the Grand Canyon Game Refuge, established by the act of June 29, 1906 (34 Stat., 607), and the Grand Canyon National Monument, set aside by presidential proclamation January 11, 1908, under the act of June 8, 1906 (34 Stat., 225), covers practically the entire area, thus constituting a third and paramount reservation of these lands.

In the very nature of things, however, the Grand Canyon can not, as a section of two national forests, a game refuge, or a national monument, be properly developed for the public benefit, and it can not be effectively administered or adequately protected.

While the south rim of the canyon has, to a small extent, been made available to the traveling public, and many thousands of tourists have thus had the opportunity of visiting certain of its scenic features, private enterprise alone, operating under extraordinary difficulties, has accomplished this development. I am informed that 106,000 tourists visited the south rim of the Grand Canyon during the calendar year 1915, but, due to lack of roads, trails, side-trip destinations, etc., this vast throng found little opportunity to obtain a full measure of enjoyment of the marvelous grandeur of this region.

It seems to be universally acknowledged that the Grand Canyon is the most stupendous natural phenomenon in the world. Certainly it is the finest example of the power and eccentricity of water erosion, and as a spectacle of sublimity it has no peer.

It would be futile to attempt to describe the Grand Canyon. However, a review of a few facts with relation to the canyon would be pertinent to a report of this character.

[1] Senate report No. 1082, Sixty-fourth Congress, second session.

The Colorado River, which flows through the gorge, drains a territory of 300,000 square miles, and it is 2,000 miles from the source of its principal tributary to its entrance into the Gulf of California. It is one of America's greatest rivers. It is proposed by this bill to establish a national park at the point in the river's course where it has worn a channel more than a mile deep. This enormous gulf measures occasionally 20 miles across the top.

The sides of the gorge are wonderfully shelved and terraced, and countless spires rise within the enormous chasm, sometimess almost to the rim's level. The walls and cliffs are carved into a million graceful and fantastic shapes, and the many colored strata of the rocks through which the river has shaped its course have made the canyon a lure for the foremost painters of American landscape.

* * * * * * *

It seems that the Grand Canyon, therefore, is entitled to the same status and to an equal degree of consideration by Congress as are enjoyed by Yellowstone, Yosemite, and the other great national parks which contain natural phenomena of the first order, and I heartily recommend immediate favorable action looking toward the enactment of this bill.

* * * * * * *

As I have already indicated, this region, undeveloped by the Federal Government, has been made accessible only to a small extent by private resources. Yet it has enjoyed the patronage of more tourists during recent seasons than any two of the largest members of the existing park system combined. It deserves the application of the same principles of administration that Congress has authorized the Department of the Interior to employ in the supervision and promotion of other scenic areas of similar importance. For this reason I hope that your committee will place no inhibition on the amount of public funds that the proper committees of the two Houses may recommend annually for appropriation without special authority of law, as has been done in the case of parks recently created. An inhibition of this character is entirely proper in the case of the establishment of national parks which are not enjoying a large tourist patronage or which it would not be advisable to immediately promote and improve, but such an inhibition would render the establishment of the Grand Canyon National Park to all intents and purposes a vain act, and would leave the reservation in practically its present status.

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SECRETARY HOUSTON'S OPINION.

In reporting on the same measures, Secretary Houston said, among other things:

This department has always recognized that the Grand Canyon of the Colorado is one of the most stupendous scenic wonders of the world and is of first importance for the consideration of Congress in the establishment of national parks. This area should by all means be administered in connection with the other national parks and this department heartily approves of its establishment.[1]

Senate 390 was not taken up for consideration during the extra session that has just closed. No data on the travel to the Grand Canyon during the past season are available, nor have we any information as to improvements in the monument.

OTHER NATIONAL PARK PROJECTS.

Besides the measure providing for the establishment of the Grand Canyon National Park, bills are pending in Congress which provide for the creation of the National Park of the Cliff Cities in New Mexico, and the Mount Baker National Park in Washington. Both of these projects have had the attention of Congress in recent years and have had the support of the Interior Department.

[1] Senate report No. 1082, Sixty-fourth Congress, second session.

The department also reported favorably on the Sawtooth National Park project when it was pending in the Sixty-fourth Congress. A bill providing for the establishment of this park, which would include the chief scenic features of the Sawtooth Mountains in Idaho, will doubtless be reintroduced in Congress during the coming winter.

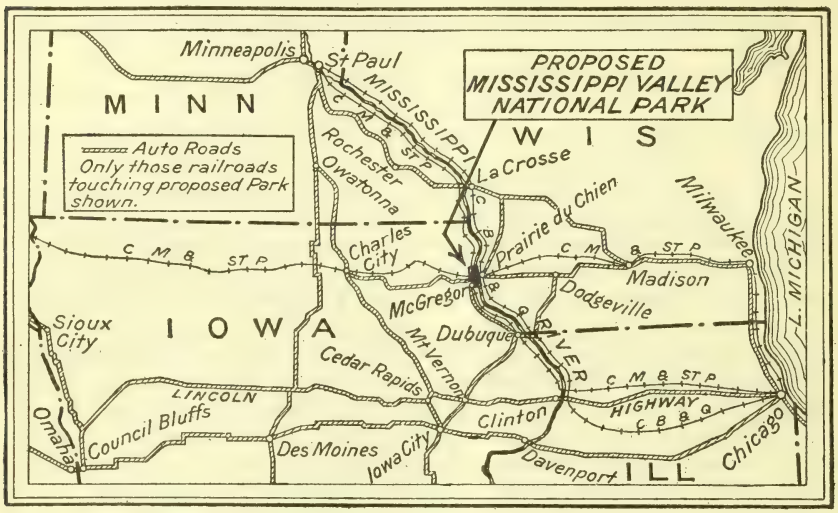
NEW NATIONAL PARK PROJECTS STUDIED.

Complying with the resolution of the United States Senate, dated September 7, 1916, Director Mather made a study of the proposed Sand Dunes National Park in Lake, Porter, and Laporte Counties, Ind. A hearing on the project was held in Chicago on October 30, 1916, and the dunes areas themselves were inspected early in November. Mr. Mather's complete report on the project was recently published. The Senate resolution required a report as to "the advisability of securing, by purchase or otherwise, all that portion of the counties of Lake, Laporte, and Porter, in the State of Indiana, bordering upon Lake Michigan and commonly known as the 'sand dunes,' with a view that such lands be created a national park." The department was also requested to furnish information as to the cost of acquiring the dunes and the probable cost of maintaining the area as a national park. Director Mather in his report states that the sand dunes of Lake and Laporte Counties are unimportant and not valuable for park purposes, but he states that the Porter County dunes possess national-park quality. A park in this county should include from 15 to 20 miles of the Lake Michigan beach. In order to include all of the scenic sand dunes in this vicinity the park should be approximately a mile wide. It is estimated that it would cost between $1,800,000 and $2,600,000 to purchase the sand-dunes land. As Congress has never purchased lands for the purpose of establishing national parks, no recommendation was made as to the advisability of establishing the Sand Dunes Park. Full data regarding the physical characteristics of the sand dunes have been submitted to Congress in compliance with the Senate resolution.

Investigation was also made last winter of the proposed Mississippi Valley National Park. This park project contemplates the purchase of lands near McGregor, Iowa, on the shore of the Mississippi River, and certain islands in the river. The investigation disclosed the fact that a national park of dignified proportions in this region should include land on both sides of the Mississippi River and the islands therein, between McGregor and Prairie du Chien, Wis. Part of the lands that might be included in a national park are now part of a Wisconsin State park. No estimate has been made of the cost of obtaining these lands. It is understood that areas of considerable size in the proposed park would be donated in the event that Congress should favorably consider the establishment of a national park.

A study of certain phases of the Mount Evans or Denver National Park project in the Rocky Mountains, a considerable distance west of Denver, was recently made. This study supplements the investigation made by officers of the General Land Office more than a year ago. Further consideration will be given to this project during the ensuing year. Considerable data relating to the proposed park have

already been submitted to Congress, and the results of further investigation will be transmitted to the Public Lands Committees for their information.



MAP SHOWING POSITION OF PROPOSED MISSISSIPPI VALLEY NATIONAL PARK, IOWA–WISCONSIN.

NATIONAL PARK LEGISLATION.

A summary of the legislation relating to the national parks enacted by Congress since the submission of last year's report is given below. The text of the various acts of Congress mentioned and, in the case of the sundry civil and deficiency appropriation acts, excerpts therefrom will be found in Appendix D, page 1012. Practically all of these measures have been fully discussed in this report.

The act of February 14, 1917,[1] entitled "An act to add certain lands to the Rocky Mountain National Park, Colorado," increased the area of Rocky Mountain National Park by 25,265 acres. The total area of the park is now 254,327. See page 808.

The act of February 26, 1917,[2] entitled "An act to establish the Mount McKinley National Park in the Territory of Alaska," created a new park, 2,200 square miles in area. The natural features of this park are described on page 864.

The act of March 2, 1917,[3] entitled "An act to authorize the sale of certain lands at or near Belton, Mont., for hotel purposes," grants authority to the Secretary of the Interior to sell to the Glacier Park Hotel Co. a tract of land across the Flathead River from Glacier Park near the western gateway. This land is now occupied by the Belton Chalets and it is understood that ultimately a new hotel will be constructed on this site.

The act of March 3, 1917,[4] entitled "An act to authorize an exchange of lands with owners of private holdings within the Glacier National Park," provides for the exchange of timber or timber and lands along

[1] 39 Stat., 916. [2] 39 Stat., 938. [3] 39 Stat., 308. [4] 39 Stat., 1122.

the roads in certain scenic sections of the park for timber or timber and lands in other sections of Glacier Park or in the national forests of Montana. What is proposed to be accomplished under the authority of this act is outlined on page 830.

The act of April 17, 1917,[1] entitled "An act making appropriations to supply deficiencies in appropriations for the fiscal year ended June 30, 1917, and prior fiscal years, and for other purposes," made funds available for the organization of the National Park Service, as authorized by the act of August 25, 1916.[2]

The act of June 12, 1917,[3] entitled "An act making appropriations for sundry civil expenses of the Government for the fiscal year ending June 30, 1918, and for other purposes," appropriated $524,780 for the National Park Service and the administration, protection, and improvement of the various national parks, and $5,000 for the preservation, development, administration, and protection of the national monuments under the Department of the Interior. It also carried a total appropriation of $217,500 for road construction and improvement in Yellowstone and Crater Lake National Parks, to be expended, however, by the Secretary of War. See page 1014. The sundry civil act also authorized the Secretary of the Interior to accept the lands in North Carolina, including Grandfather Mountain, which will be donated for park purposes. See page 865.

NEEDS OF THE NATIONAL PARK SERVICE.

The following is a brief summary of the urgent needs of the National Park Service:

(1) The inhibition on the appropriation of funds for the development of Rocky Mountain National Park contained in the organic act creating the park should be repealed. A discussion of this necessary legislation will be found on page 808.

(2) The War Department should be relieved at once of the duty of protecting and improving Yellowstone National Park; and complete control of the administration, protection, and improvement of this park should be centralized in the National Park Service, thus placing Yellowstone Park in precisely the same status as that enjoyed by the other members of the park system except, of course, Crater Lake. In the case of Crater Lake, the War Department has control of the construction and improvement of roads, but legislation designed to remedy the Yellowstone situation should transfer the control of the Crater Lake roads to this department. See discussion on pp. 814–815.

(3) The boundaries of Sequoia National Park should be extended to include the Kings and Kern River gorges and the crest of the Sierra Nevada, including Mount Whitney, as recommended on page 852.

(4) Part of the Jackson Hole region should be added to Yellowstone National Park. The Teton Mountains, Jackson Lake, and the headwaters of the Yellowstone River naturally belong to the park, and the areas embracing these natural features should be added at an early date.

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[1] Public, No. 2, Sixty-fifth Congress.
[2] 39 Stat., 535.
[3] Public No. 21, Sixty-fifth Congress.

(5) The National Park system should be more nearly rounded out by the early addition of the Grand Canyon, now a national monument.

(6) Appropriations should be made for the continuation of road and trail improvements in the national parks, for the preservation and improvement of the national monuments, and for conducting, on a larger scale, the work of disseminating information regarding the scenic, scientific, and historic features of the national parks and monuments. The most important road projects are the Lake McDonald road in Glacier Park, the Carbon River road in Mount Rainier National Park, the extension of the Giant Forest road north of the Marble Fork River to meet the county road between Sequoia and General Grant National Parks now under construction, the completion of the new El Portal road in Yosemite Park, and the elimination of the Point Lookout road in Mesa Verde Park by the construction of a new cut-off highway ascending the mesa. New administration buildings are desperately needed in Glacier, Crater Lake, and Sequoia National Parks. The need of a new Government free bathhouse at Hot Springs Reservation has been mentioned so often that it needs no further reiteration.

(7) Appropriations should be made for assuming the administrative control and providing for the protection of Mount McKinley, Hawaii, and Lassen Volcanic National Parks.

IN CONCLUSION.

When the season of 1916 proved by its increased patronage on the exposition season of 1915 that our national parks need no world's fairs to lure the American people to their neighborhoods, it was clear that the movement begun here in Washington the year before to make known to America its own scenic grandeur had proved successful. Even more gratifying is the revelation of public sentiment made by the spectacular increase in national parks patronage during the season of 1917 over that of 1916.

Meantime, in the spring, our Nation had been plunged into the most terrible catastrophe of war this world has ever seen. It was confidently predicted by many that in these circumstances there would be no summer travel. The question, as I have explained, was even seriously asked by many whether the national parks would in this stress be opened by the Government.

Half a year after the beginning of an actual state of war, however, notwithstanding the entire upsetting of our national habits, the raising of a mighty army of the flower of our young manhood and the intense concentration of the national gaze upon the military and economic situations of the world, we find the people of the whole country testifying in the most practical possible way to the potency of our national parks for rest and preparation against the ordeal of fire to come.

This magnificent demonstration proves again, as has been so abundantly shown so often before, the soundness and reality of the great mission of education, recreation, and health in which this Service is engaged.

Very respectfully,

HORACE M. ALBRIGHT,
Acting Director.

The SECRETARY OF THE INTERIOR.

SEVENTEEN NATIONAL PARKS CONTAINING 9,773 SQUARE MILES OR 6,254,568 ACRES. TWENTY-TWO NATIONAL MONUMENTS CONTAINING 143.4 SQUARE MILES OR 91,824 ACRES.

18923°—INT 1917—VOL 1. (To face page 880.)

APPENDIX A.

THE NATIONAL PARKS AND MONUMENTS.

Map showing location of all national parks and monuments administered by National Park Service, Department of the Interior. See opposite page.

The national parks.

The national monuments administered by the National Park Service, Department of the Interior.

The national monuments administered by the Department of Agriculture.

The national monuments administered by the War Department.

THE NATIONAL PARKS.

Number, 17; total area, 9,773 square miles; chronologically in order of creation.

Name.	Location.	When established.	Statute reference.	Area (square miles).	Area (acres).	Private lands (acres).	Visitors, 1917.	Special characteristics.
Hot Springs Reservation.	Middle Arkansas.....	Apr. 20, 1832	{4 Stat., 505..... 21 Stat., 288.....}	1½	911.63	None.	[2]135,000	46 hot springs possessing curative properties—many hotels and boarding houses—20 bath houses under public control.
Yellowstone.....	Wyoming, Montana, and Idaho.	Mar. 1, 1872	17 Stat., 32, 33..	[1]3,348	2,142,720	None.	35,400	More geysers than in all rest of world together—Boiling springs—Mud volcanoes—Petrified forests—Grand Canyon of the Yellowstone, remarkable for gorgeous coloring—Large lakes—Waterfalls—Vast wilderness inhabited by deer, elk, bison, moose, antelope, bear, mountain sheep, etc.—Greatest wild bird and animal preserve in world.
Casa Grande Ruin (kä'sä grän'dā).	Arizona.....	Mar. 2, 1889	25 Stat., 961.....	¾	480	None.	2,437	These ruins are one of the most noteworthy relics of a prehistoric age and people within the limits of the United States. Discovered in ruinous condition in 1694.
Sequoia (sē-kwoi'ȧ).....	Middle eastern California..	Sept. 25, 1890	26 Stat., 478, 650.	252	161,597	3,049.81	18,510	The Big Tree National Park—12,000 Sequoia trees over 10 feet in diameter, some 25 to 36 feet in diameter—Towering mountain ranges—Startling precipices.
Yosemite (yō-sĕm'ĭ-tē)...	.....do.....	Oct. 1, 1890	{26 Stat., 650..... 33 Stat., 702..... 34 Stat., 831.....}	1,125	719,622.4	19,827	34,510	Valley of world-famed beauty—Lofty cliffs—Romantic vistas—Waterfalls of extraordinary height—3 groves of big trees—Large areas of snowy peaks—Waterwheel Falls.
General Grant.....	.....do.....	.....do.....	26 Stat., 650.....	4	2,536	160	17,390	Created to preserve the celebrated General Grant Tree, 35 feet in diameter—6 miles from Sequoia National Park.
Mount Rainier (rā-nēr')..	West central Washington..	Mar. 2, 1899	30 Stat., 993.....	324	207,360	18.2	35,568	Largest accessible single peak glacier system—28 glaciers, some of large size—48 square miles of glacier, 50 to 500 feet thick—Wonderful sub-alpine wild-flower fields.
Crater Lake.....	Southern Oregon.....	May 22, 1902	32 Stat., 202.....	249	159,360	2,458.11	11,645	Lake of extraordinary blue in crater of extinct volcano, no inlet, no outlet—Sides 1,000 feet high.
Wind Cave.....	South Dakota.....	Jan. 9, 1903	32 Stat., 765.....	16	10,522	160	16,742	Well known by reason of a cavern therein having many miles of galleries and numerous chambers of considerable size containing many peculiar formations.

Platt	Southern Oklahoma	July 1, 1902 Apr. 21, 1904	32 Stat., 641, 655 33 Stat., 220	1⅓	848.22	None.	[2] 35,000	Many sulphur and other springs possessing medicinal value, under Government regulation.
Sullys Hill	North Dakota	Apr. 27, 1904	33 Stat., 322, 323, 2368.	1⅓	780	None.	2,207	Small rugged hill containing prehistoric ruins—Practically a local park.
Mesa Verde (mā′sȧ vĕr′dȧ)	Southwestern Colorado	June 29, 1906	34 Stat., 616	77	42,376	880	2,223	Most notable and best preserved prehistoric cliff dwellings in United States, if not in the world.
Boundary changed	do	June 30, 1913	38 Stat., 82, 83, 84		48,966.4	993		
Glacier (glā′shĕr)	Northwestern Montana	May 11, 1910	36 Stat., 354	1,534	981,681	16,508.11	15,050	Rugged mountain region of unsurpassed Alpine character—250 glacier-fed lakes of romantic beauty—60 small glaciers—Peaks of unusual shape—Precipices thousands of feet deep—Almost sensational scenery of marked individuality.
Rocky Mountain	North middle Colorado	Jan. 26, 1915	38 Stat., 798	358	229,062	[2] 3,745	[2] 117,186	Heart of the Rockies—Snowy range, peaks 11,000 to 14,250 feet altitude—Remarkable records of glacial period.
Boundary changed	do	Feb. 14, 1917	39 Stat., 916	397.4	254,327	[2] 20,693		
Hawaii (hä-wī′ē)	Hawaiian Islands	Aug. 1, 1916	39 Stat., 432	118	75,295	[2] 41,000	([3])	3 separate areas: 2—Kilauea, continuously active for century, and Mauna Loa, altitude 13,675 (largest active volcano in world, erupting every decade), are on Hawaii; Haleakala, on Maui, 10,000 feet high, with tremendous rift in summit 8 miles across and 3,000 feet deep; contains many cones, gorgeous tropical forests, mahogany groves, and lava caves; erupted 200 years ago.
Lassen Volcanic (lăs′ĕn)	Northern California	Aug. 9, 1916	39 Stat., 442	124	79,561.58	880	[2] 8,500	Only active volcano in United States proper—Lassen Peak, 10,465 feet in altitude—Cinder Cone, 6,879 feet—Hot springs—Mud geysers—Ice caves—Majestic canyons—Numerous lakes—Fine forests.
Mount McKinley	South central Alaska	Feb. 26, 1917	39 Stat., 938	2,200	1,408,000	None.	([3])	Highest mountain in North America (altitude 20,300 feet)—Rises higher above surrounding country than any other mountain in world.

[1] In Wyoming, 3,114 square miles; in Montana, 198 square miles; in Idaho, 36 square miles.

[2] Estimated.

[3] No record kept.

THE NATIONAL MONUMENTS.

Administered by the National Park Service, Department of the Interior.

[Number, 22; total area, 143.4 square miles; chronologically in order of creation.]

Name.	Location.	Date of creation.	Statute reference of proclamation.	Area (acres).	Special characteristics.
Devils Tower	Wyoming	Sept. 24, 1906	34 Stat., 3236	1,152	Remarkable natural rock tower, of volcanic origin, 1,200 feet in height.
Montezuma Castle	Arizona	Dec. 8, 1906	34 Stat., 3265	[1] 160	Prehistoric cliff-dwelling ruin of unusual size situated in a niche in face of a vertical cliff. Of scenic and ethnological interest.
El Morro	New Mexico	Dec. 8, 1906 June 18, 1917	34 Stat., 3264 40 Stat., Proc., 1377.	160 240	Enormous sandstone rock eroded in form of a castle, upon which inscriptions have been placed by early Spanish explorers. Contains cliff-dweller ruins. Of great historic, scenic, and ethnologic interest.
Petrified Forest	Arizona	Dec. 8, 1906 July 31, 1911	34 Stat., 3266 37 Stat., 1716	25,625	Abundance of petrified coniferous trees, one of which forms a small natural bridge. Is of great scientific interest.
Chaco Canyon (chä'kō)	New Mexico	Mar. 11, 1907	35 Stat., 2119	[1] 20,629	Numerous cliff-dweller ruins, including communal houses, in good condition, and but little excavated.
Muir Woods [2] (mūr)	California	Jan. 9, 1908	35 Stat., 2174	295	One of the most noted redwood groves in California, and was donated by Hon. William Kent, Member of Congress. Located 7 miles from San Francisco.
Pinnacles	do	Jan. 16, 1908	35 Stat., 2177	2,080	Many spirelike rock formations, 600 to 1,000 feet high, visible many miles; also numerous caves, and other formations.
Natural bridges	Utah	Apr. 16, 1908 Sept. 25, 1909 Feb. 11, 1916	35 Stat., 2183 36 Stat., 2502 39 Stat., Proc., 44.	120 [1] 2,740 [1] 2,740	3 natural bridges, among largest examples of their kind. Largest bridge is 222 feet high, 65 feet thick at top of arch; arch is 28 feet wide; span, 261 feet; height of span, 157 feet. Other two slightly smaller.
Lewis and Clark Cavern [2]	Montana	May 11, 1908 May 16, 1911	35 Stat., 2187 37 Stat., 1679	160 160	Immense limestone cavern of great scientific interest, magnificently decorated with stalactite formations. Now closed to public because of depredations by vandals.
Tumacacori (tū-mä-kä'kō-rē)	Arizona	Sept. 15, 1908	35 Stat., 2205	10	Ruin of Franciscan mission dating from sixteenth century, until recent years in fair preservation, but now rapidly disintegrating.
Navajo (năv'ä-hō)	do	Mar. 20, 1909 Mar. 14, 1912	36 Stat., 2491 37 Stat., 1733	[1] 600 360	Numerous pueblo, or cliff-dweller ruins, in good preservation.
Mukuntuweap (mŭk-ŭn-tū'-weap)	Utah	July 31, 1909	36 Stat., 2498	[1] 15,840	Magnificent gorge (Zion Canyon), depth from 800 to 2,000 feet, with precipitous walls. Of great beauty and scenic interest.
Shoshone Cavern (shō-shō'nē)	Wyoming	Sept. 21, 1909	36 Stat., 2501	210	Cavern of considerable extent, near Cody.
Gran Quivira (grän kē-vē'rä)	New Mexico	Nov. 1, 1909	36 Stat., 2503	[1] 160	One of the most important of earliest Spanish mission ruins in the Southwest. Monument also contains Pueblo ruins.
Sitka	Alaska	Mar. 23, 1910	36 Stat., 2601	[1] 57	Park of great natural beauty, and historic interest as scene of massacre of Russians by Indians. Contains 16 totem poles of best native workmanship.
Rainbow Bridge	Utah	May 30, 1910	36 Stat., 2703	160	Unique natural bridge of great scientific interest and symmetry. Height 309 feet above water, and span is 278 feet, in shape of rainbow.
Colorado	Colorado	May 24, 1911	37 Stat., 1681	13,883	Many lofty monoliths, and is wonderful example of erosion, and of great scenic beauty and interest.
Papago Saguaro (pä'pä-gō sá-gwä'rō).	Arizona	Jan. 31, 1914	38 Stat., 1991	2,050	Splendid collection of characteristic desert flora and numerous pictographs. Interesting rock formations.
Dinosaur (dī'nō-sôr)	Utah	Oct. 4, 1915	39 Stat., Proc., 32	80	Deposits of fossil remains of prehistoric animal life of great scientific interest.
Sieur de Monts [2] (sē-eûr dĕ mŏnt)	Maine	July 8, 1916	39 Stat., Proc., 65	[1] 5,000	Mountainous area adjacent to Bar Harbor which includes 10 mountains and several lakes. Is very wild and rugged. Most romantic and beautiful mingling of mountain and ocean scenery on Atlantic Coast.
Capulin Mountain (kăp'ū-lĭn)	New Mexico	Aug. 9, 1916	39 Stat., Proc., 72	681	Cinder cone of geologically recent formation.
Verendrye (vĕr-rŏn-drē)	North Dakota	June 29, 1917	40 Stat., Proc., 1380.	253.04	Includes Crowhigh Butte, peculiar mountain formation, from which Explorer Verendrye first beheld territory beyond Missouri River.

[1] Estimated.

[2] Donated to the United States.

THE NATIONAL MONUMENTS.

Administered by the Department of Agriculture.

[Number, 11; total area, 1,763 square miles; chronologically in order of creation.]

Name.	Location.	Date of creation.	Statute reference of proclamation.	Area (acres).	Special Characteristics.
Gila Cliff Dwellings (hē'lä)	New Mexico	Nov. 16, 1907	35 Stat., 2162	160	Numerous cliff-dweller ruins of much interest and in good preservation.
Tonto	Arizona	Dec. 19, 1907	35 Stat., 2168	[1] 640	Do.
Grand Canyon	do	Jan. 11, 1908	35 Stat., 2175	[1] 806,400	Includes the most wonderful portion of the Grand Canyon of the Colorado.
Jewel Cave	South Dakota	Feb. 7, 1908	35 Stat., 2180	[1] 1,280	Limestone cavern of much beauty and considerable extent, limits of which are as yet unknown.
Wheeler	Colorado	Dec. 7, 1908	35 Stat., 2214	300	Of much interest from geological standpoint as example of eccentric erosion and extinct volcanic action. Of much scenic beauty.
Mount Olympus	Washington	Mar. 2, 1909 Apr. 17, 1912 May 11, 1915	35 Stat., 2247 37 Stat., 1737 39 Stat., Proc., 6.	608,640 608,480 299,370	Contains many objects of great and unusual scientific interest, including many glaciers. Is summer range and breeding ground of the Olympic elk.
Oregon Caves	Oregon	July 12, 1909	36 Stat., 2497	480	Extensive caves in limestone formation of much beauty; magnitude not entirely ascertained.
Devil Postpile	California	July 6, 1911	37 Stat., 1715	800	Spectacular mass of hexagonal basaltic columns, like an immense pile of posts. Said to rank with famous Giant's Causeway in Ireland.
Walnut Canyon	Arizona	Nov. 30, 1915	39 Stat., Proc., 41	960	Contains cliff dwellings of much scientific and popular interest.
Bandelier (Băn-dĕ-lēr')	New Mexico	Feb. 11, 1916	39 Stat., Proc., 44	22,075	Vast numbers of cliff-dweller ruins, with artificial caves, stone sculpture, and other relics of prehistoric life.
Old Kasaan (kä-sän')	Alaska	Oct. 25, 1916	39 Stat., Proc., 1351	38.3	Abandoned Indian village in which there are numerous remarkable totem poles and other objects of historical interest.

[1] Estimated.

THE NATIONAL MONUMENTS.

Administered by the War Department.

[Number, 2; total area, 6 acres; chronologically in order of creation.]

Name.	Location.	Date of creation.	Statute reference of proclamation.	Area (acres).	Special Characteristics.
Big Hole Battle Field [1]	Montana	June 23, 1910		5	Site of battlefield on which battle was fought Aug. 9, 1877, between a small force of United States troops and a much larger force of Nez Perce Indians, resulting in rout for the Indians.
Cabrillo (kä-brēl'yŏ)	California	Oct. 14, 1913	38 Stat., 1965	1	Of historic interest because of discovery of the territory now partly embraced in the State of California by Juan Rodriguez Cabrillo, who at this point first sighted land on Sept. 28, 1542.

[1] Set aside by Executive order.

APPENDIX B.

REPORTS OF SUPERVISORS OF THE NATIONAL PARKS.

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HOT SPRINGS RESERVATION.

Dr. Wm. P. Parks, Supervisor, Hot Springs, Ark.

GENERAL STATEMENT.

This is my third annual report since assuming charge of the reservation, and it is very pleasing indeed to be able to report a very substantial increase in the business of the bathhouses and number of visitors as compared with the previous year.

During this year there were sold 639,711 paid baths in the different pay bathhouses, which is a net gain of 95,340 over last year, the total last year having been 544,371. The total receipts of the several bathhouses this year were $302,515.06, and the total receipts last year $243,568.29, making a net gain of $58,946.77. During the month of March, this year, the the total receipts of the bathhouses were $47,450.53, and for the month of March, last year, $43,062.53, making a net gain of $4,388. The patronage of the bathhouses is larger in this month than in any other month of the year.

It is estimated that approximately 135,000 persons visited Hot Springs during the past fiscal year.

In addition to the paid baths noted above, there were also given 2,891 complimentary baths in the pay bathhouses, 101,255 baths at the Government free bathhouse, and 5,805 baths at the Levi Memorial bathhouse, making a total of 749,662 baths, an increase in the total number of baths this year over last year of 95,366.

It is believed that the popularity and patronage of this resort will increase year by year as the public generally becomes more acquainted with the results to be obtained here. The splendid plan now being pursued by the National

Park Service in the matter of bringing the features of the national parks to the attention of the entire country will, I feel sure, add materially to the patronage here.

CITY OF HOT SPRINGS.

Since my last annual report there has been a marked change in the management of the city's affairs. Under a recent act of the Arkansas Legislature the city is now operated under the commission-city manager plan of government, there being a mayor and four commissioners, five in all, all of whom are substantial business men and familiar with the city's needs.

The commission elects a city manager, by whom all the business of the city is transacted, and in this manner all problems are handled on a business basis, which is generally believed to be far more preferable than the old plan of mayor and aldermen under which the city was formerly operated.

Under this new system special attention is being given to cleanliness and sanitation, and results are already perceptible. It is intended to promote a universal plan of beautification, which is not only desirable but very necessary, especially in a resort city catering to the visiting public for its patronage.

I am pleased to state that cordial relations exist between the present city administration and this office, with the result that each cooperates with the other in all matters tending to protect the visiting public.

ADMINISTRATION.

During the past year marked progress has been made with reference to the strict enforcement of the rules and regulations governing the Hot Springs Reservation, and it has been my purpose to require strict compliance as nearly as possible with all such rules. In this matter I have had hearty cooperation from all employees of the reservation, and they have rendered able and efficient service.

Our work and records are so systematized that there seems little opportunity to improve them, as they meet present requirements. I have recommended a revision of the rules and regulations which, if the service sees its way clear to adopt, will increase materially the present revenues of the reservation and at the same time add to its regulation.

Of the large number of visitors that apply to this office daily each and every one is accorded polite and courteous attention and their wants are attended to in such a manner as to make them feel welcome.

There is a thorough personal inspection made of each bathhouse receiving water from the reservation at least once during each month, and whenever defects are found the management is so informed and directed to correct them. In this connection it pleases me to state that I have had generally hearty cooperation from the bathhouse managements.

DRUMMING.

Under the head of "Drumming" in my report of last year I stated "I have some plans in view which if worked out successfully during the coming year will, I believe, deal a very hard blow to this nefarious evil."

Following up this plan, beginning last September there was inaugurated a crusade against the drumming doctors in which many of the antidrumming physicians took a prominent part by raising funds from all persons in sympathy with this movement and employing detectives and attorneys to secure evidence. Through this means and with the hearty cooperation of this office quantities of evidence were secured which resulted in prosecutions and indictments in the State courts.

Action was also taken by this office and evidence submitted to the department which resulted in striking the names of 14 physicians from the list of registered physicians filed in this office. Also, the guests of 17 hotels, rooming houses and boarding houses were denied the baths for a period of three months in each instance, charges of drumming having been sustained against the proprietors of these places. As a final result, it is extremely gratifying to me to now report that doctor drumming in Hot Springs is practically eliminated. In fact, it is the subject of common comment that Hot Springs is now freer from drumming than ever before in its history, and the laws, rules, and regulations are being more rigidly enforced and observed.

This result has not been accomplished without very much hard work, and the citizenship here generally feels grateful to the department for the substantial backing given in this movement for the protection of the visitors, as

it is undoubtedly the most effective work of this character that has ever been done in Hot Springs.

The personnel and standing of the physicians whose names appear on the resident registered list will compare favorably with those of any other city. Many of these physicians have national reputations and, I will venture to say, have no superiors when taken in connection with their particular lines of practice.

EMPLOYEES.

There are 30 regular employees engaged in the administration, maintenance, and protection of the reservation, all of whom were appointed from the State of Arkansas under civil service rules.

There have been no permanent changes in the personnel during the past fiscal year. However, Richard L. Lawrence, manager of the free bathhouse, and John W. St. Clair, train inspector, have been granted three months' leave without pay by the Service and are now training at the officers' training camp at Fort Logan H. Roots. During their absence the duties of the former are being handled by the head attendant at the free bathhouse, while Richard L. Gaffney, regular mounted policeman, has been temporarily appointed policeman and detailed as train inspector during the absence of Mr. St. Clair.

RECEIPTS AND DISBURSEMENTS.

The receipts and disbursements on account of the Hot Springs Reservation during the fiscal year ended June 30, 1917, were as follows:

Proceeds, sale of lots, special fund.

July 1, 1917, balance remaining to credit of fund of $82,518 derived from the sale of Government lots	$4,972.49

Protection and improvement, Hot Springs Reservation, indefinite (revenue fund).

July 1, 1916, balance to credit of revenue fund		$60,691.84
Receipts, July 1, 1916, to June 30, 1917, inclusive:		
Water rents	$27,975.00	
Ground rents[1]	7,600.00	
Sale of bath attendants' badges	17.60	
Repay of G. W. Evans, chief disbursing clerk, of amount disallowed in his accounts for telegraph service	.25	
Repay of W. P. Parks, special disbursing officer, of amount disallowed in his accounts for September, 1916, quarter, by Auditor for Interior Department, for ice furnished at official residence, paid in quarter ended March 31, 1917	18.90	
Total receipts		35,611.75
Total available		96,303.59
Disbursements:		
Salaries of supervisor and reservation employees	$26,557.50	
Improvements, repairs, incidentals, and miscellaneous supplies—		
Paid by supervisor	499.45	
Vouchers approved by supervisor and forwarded to department for payment (including $60, traveling expenses of supervisor)	2,692.66	
Expended by supervisor	29,749.61	
Additional expended by the department	1,553.37	
Total disbursements		31,302.98
Available balance, July 1, 1917		65,000.61

[1] No ground rent collected for Arlington Hotel for quarter ended June 30, 1917.

IMPROVEMENTS AND MAINTENANCE.

During the past year I have avoided entering upon any new or extensive improvements, for the reason that it was deemed advisable to wait until after a fixed plan of improvement shall have been prepared. Several improvements I have had in view were abandoned for this reason.

There was, however, constructed an addition to the pump house adjoining the supervisor's office on the north. It has been practically reconstructed on a substantial and practical basis in accordance with a plan prepared by Mr. James F. Gill, of the department. This construction is of brick with an ornamental front, with concrete floors and concrete bases provided for each pump and motor. It is commodious, making all pumps now easy of access, and room yet remains for the installation of at least two more pumps. The outside walls have been painted white to correspond with the supervisor's office building.

The reservation has been kept up to a high standard of condition. Much work has been done in the maintenance of roads, and approximately 460 cubic yards of gravel have been hauled and placed upon the roads.

Much time has been expended in the care of lawns, flowers, shrubbery, etc., all of which has redounded to the beautification of the reservation. The hedges have been kept neatly trimmed, trees pruned, and other minor matters carefully looked after. Old-time visitors to Hot Springs have commented that the reservation front now presents a more pleasing appearance than ever before. In fact, it has been stated that there is no more beautiful place in the United States than the reservation front.

The regular routine work required to maintain the reservation in its present state consumes practically all of the time of the regular laborers.

GOVERNMENT FREE BATHHOUSE.

The Government free bathhouse has been operated during the past year for the indigent in accordance with the acts of Congress of December 16, 1878, and March 2, 1911, with the following results:

Total applications for free baths	5,356
Number refused	210
Tickets issued to—	
White males	2,915
White females	387
Colored males	1,129
Colored females	715
Total tickets issued on original applications	5,146
Tickets reissued to—	
White males	1,572
White females	220
Colored males	551
Colored females	143
Total tickets reissued	2,486
Total tickets to—	
White males	4,487
White females	607
Colored males	1,680
Colored females	858
Total tickets, including reissues	7,632
Baths given to—	
White males	59,933
White females	8,305
Colored males	21,883
Colored females	11,134
Total number baths given	101,255

Average number of baths given daily, 330+.

From the foregoing table it is noted that the decrease from last year in the number of baths given is 2,143. During the past year care has been exercised to secure strict compliance with the act of Congress which prohibits from bathing in the Government free bathhouse any person who is able to pay for the baths.

This establishment is of great benefit to afflicted indigent persons who come to this resort for relief, and has proved to be a great boon to suffering humanity.

As has been reported to the department from time to time, the condition of the free bathhouse has reached a stage where it is absolutely necessary that some provision be made in the near future for its complete reconstruction or for the building of a new bathhouse in its entirety. It is not necessary that such a bathhouse should be elaborate, but it should be substantial, and every provision should be made for complete and thorough sanitation and scientific ventilation. It should include modern quarters in the second story for the operation of a free clinic for persons unable to pay for professional services. I trust that ways and means may soon be provided which will enable the service to consummate this very necessary improvement.

FREE CLINIC.

The clinic which is operated by a corps of registered physicians in the rooms over the Government free bathhouse has been continued during the fiscal year ended June 30, 1917. The physicians engaged in this work give a portion of their time between the hours of 1 and 3 p. m. each day, except Sundays and holidays, in the treatment of various persons who are unable to secure funds with which to pay for treatment.

The diseases most numerous which have been presented at this clinic for treatment during the year are as follows: Rheumatism, gonococcal, and from other causes; malarial troubles; gonorrhea, acute, subacute, and chronic; cystitis; prostatitis; urethral stricture; bubo, inguinal; epididymitis, gon.; chancroid; chancre; balanitis; herpes preputialis; phimosis; syphilis, all stages and manifestations; venereal warts; urethritis, specific and nonspecific; pyelitis; arthritis; arthritis deformans; pellagra; neuritis; hypoacidity; sciatica; nephritis; multiple sclerosis; arthralgia; neurasthenia; tabes dorsalis (locomotor ataxia); paresis (incipient); and many cases of eczema and other skin diseases. Myelitis and other diseases were few in number. In addition to the above there were given in all approximately 200 Wasserman tests for purposes of diagnostic confirmation.

A report from the clinic shows that in all there were treated during the year 364 patients, 351 of which have either been dismissed or discontinued treatment, with 13 patients remaining on hand July 1, 1917. These 351 patients were from 34 different States in the Union. In the cases of the 351 patients dismissed or discontinuing treatment, the following results are reported by the physicians of the clinic:

No results, due to insufficient treatment	88
Slight improvement	24
Much improvement	110
Cured	129
Total	351

The work done in this clinic has resulted in much good to indigent persons who otherwise probably would not be able to secure medical treatment.

Before satisfactory results can be obtained in their entirety it will be necessary to have a modern and up-to-date clinic equipped with the latest modern appliances throughout, which it is believed should be provided for in connection with the proposed new Government free bathhouse. Practically all of those availing themselves of the advantages of this clinic are patrons of the Government free bathhouse and without means to pay for either baths or treatment.

When new and modern clinical facilties shall have been established I have in view a practical and economical plan for its operation in a systematic manner which contemplates the keeping of a complete set of records that observation and treatment shall have continuity for those patients who return from year to year, as many of them do.

PAY BATHHOUSES.

There are at the present time 19 pay bathhouses in Hot Springs receiving hot water from the Hot Springs Reservation, with the following rates for baths, fixed in each instance by the Secretary of the Interior, in effect therein:

Bathhouse.	Single bath.	Course of 21 baths.	Bathhouse.	Single bath.	Course of 21 baths.
Alhambra	$0.40	$7.00	Maurice	$0.60	$11.00
Arlington	.65	12.00	Moody	.50	9.00
Buckstaff	.60	11.00	Ozark	.40	7.00
Eastman	.55	10.00	Ozark Sanatorium	.45	8.00
Fordyce	.65	12.00	Pythian (colored)	.25	4.00
Hale	.50	9.00	Rector	.45	8.00
Imperial	.55	10.00	Rockafellow	.45	8.00
Lamar	.45	8.00	St. Joseph's Infirmary	.50	9.00
Magnesia	.40	7.00	Superior	.50	9.00
Majestic	.55	10.00			

In addition to the above there is a uniform attendant's fee, also fixed by the Secretary of the Interior, of 15 cents for a single bath or $3 per course of 21 baths, which is collected by the bathhouse manager and properly accounted for to the attendant.

All bathhouses sell half tickets for 10 baths, and some of the bathhouses sell quarter tickets for 5 baths, at one-half and one-fourth, respectively, of the rates shown above for a full course of 21 baths.

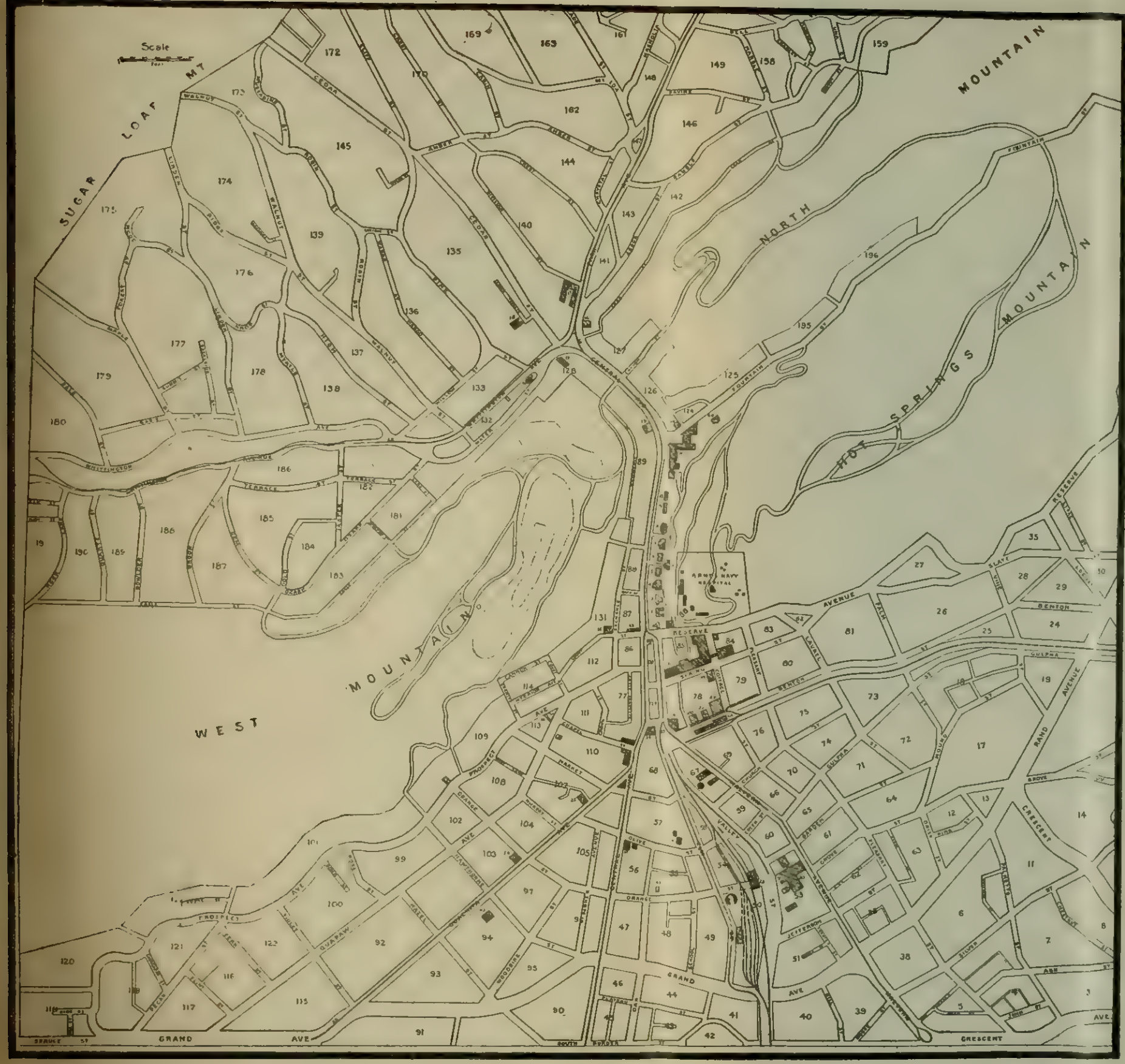
There are at present 26 hot-water and ground leases in force, as shown in the following table:

Hot-water and ground leases.

Name of bathhouse, etc.	Lessee.	Tubs.	Date of lease.	Expiration.
Alhambra	Alhambra Bathhouse Co	18	Mar. 1, 1916	Feb. 28, 1919
Arlington [1]	Arlington Hotel Co	68	Mar. 21, 1914	Mar. 3, 1932
Buckstaff	Buckstaff Bathhouse Co	31	Jan. 1, 1912	Dec. 31, 1931
Eastman [1]	New York Hotel Co	64	May 13, 1912	May 12, 1932
Fordyce	S. W. Fordyce, jr., trustee	30	Jan. 1, 1915	Dec. 31, 1934
Hale	Mercantile Trust Co., trustee	25	.....do.....	Do.
Horseshoe [2]	D. Fellows Platt	30	Jan. 1, 1895	Dec. 31, 1909
Imperial	Chas. N. Rix	27	Jan. 1, 1912	Dec. 31, 1931
Lamar [3]	M. C. Tombler and G. H. Buckstaff	30	Jan. 1, 1897	Dec. 31, 1916
Levi Memorial	Leo N. Levi Memorial Hospital Association.	5	Nov. 1, 1914	Oct. 31, 1924
Magnesia [3]	Chas. B. Platt	30	Jan. 1, 1895	Dec. 31, 1909
Majestic [1]	Avenue Hotel Co	23	Jan. 1, 1913	Dec. 31, 1932
Maurice	Maurice Bath Co	29	Jan. 1, 1912	Dec. 31, 1931
Moody [1]	Nicholas M. Moody	16	July 1, 1910	June 30, 1920
Ozark [3]	W. S. Sorrells and F. B. Latta	26	Jan. 1, 1904	Dec. 31, 1913
Ozark Sanatorium	Ozark Sanatorium Co	10	Sept. 17, 1912	Sept. 16, 1922
Park [1 4]	Garland Hotel Co	47	May 13, 1912	May 12, 1932
Pythian (colored)	Knights of Pythias (colored)	10	Dec. 16, 1914	Dec. 15, 1924
Rector	Elias W. Rector estate	12	Apr. 16, 1914	Apr. 15, 1924
Rockafellow	Mahala J. Rockafellow	18	July 1, 1916	June 30, 1918
St. Joseph's Infirmary [1]	Sister Superior	10	Feb. 1, 1914	Jan. 31, 1924
Superior	Superior Bathhouse Co	20	Feb. 15, 1916	Feb. 14, 1936
Waverly [5]	New Waverly Hotel Co	20	Mar. 24, 1893	Mar. 23, 1913
Horse Pool [6 4]	Simon Cooper	2	Oct. 30, 1912	Oct. 30, 1917
Arlington Hotel, ground lease.	Arlington Hotel Co	.....	Mar. 21, 1914	Mar. 3, 1932
Hot Springs Mountain Observatory, ground lease.	Hot Springs Mountain Observatory Co	.....	Sept. 1, 1913	Sept. 1, 1923

[1] Water used in private bathrooms in portion of tubs leased.
[2] Closed Dec. 31, 1915.
[3] Tenants holding over.
[4] Destroyed by fire Sept. 5, 1913.
[5] Destroyed by fire Jan. 23, 1910.
[6] Water sufficient to supply 2 tubs.

While there have been no new bathhouses built during the present year, I feel that I am safe in saying that the houses now in operation have materially increased their efficiency. The bathing public is appreciative of the good service and courteous treatment, all of which redounds to the credit of the reservation.



Map of a Portion of Hot Springs.

LEGEND.

The numbers in this list refer to the smaller numbers on the map; the larger numbers on the map are the numbers of the squares.

1. Superintendent's office.
2. Lamar bathhouse.
3. Buckstaff baths.
4. Ozark bathhouse.
5. Magnesia bathhouse.
6. Horse Shoe bathhouse.
7. Palace bathhouse.
8. Maurice bathhouse.
9. Hale bathhouse.
10. Superior bathhouse.
11. Arlington Hotel and baths.
12. Government free bathhouse.
13. Imperial bathhouse.
14. Hot Springs bathhouse and hotel.
15. Rector bathhouse and Waukesha Hotel.
16. Rockafellow bathhouse and hotel.
17. Majestic Hotel and baths.
18. St. Joseph Infirmary.
19. Great Northern Hotel and baths.
20. Post office.
21. Business Men's League.
22. Rock Island Station.
23. Iron Mountain Station.
24. Ozark Sanitarium.
25. Alhambra bathhouse.
26. Moody Hotel and baths.
27. City Hall and Auditorium Theater.
28. ═══ Electric street car line.
29. Main entrance to reservation.
30. Park Hotel and baths.
31. Eastman Hotel and baths.
32. Arkansas National Bank.
33. Security Bank.
34. Citizens National Bank.
35. Elks' Home and Masonic Temple.
36. First Baptist Church.
37. First Methodist Church.
38. Episcopal Church.
39. Catholic Church.
40. First Presbyterian Church.
41. Whittington Lake Park.
42. High-school building.
43. County courthouse.
44. Superintendent's official residence.

North, West, and Hot Springs Mountains and Whittington Lake Park form the permanent Hot Springs Reservation, owned and operated by the Government.

In addition to the magnificent bathhouses which have already been constructed along Bathhouse Row the bathing facilities will soon be added to by the construction of entirely new and modern bathhouses on the sites now occupied by the Horse Shoe, Magnesia, Ozark, and Lamar bathhouses. The leases on all of these sites have long since expired, and plans and specifications for the rebuilding of all these houses are now before the Service for consideration, with the exception of the plans for the Lamar bathhouse, which are now in course of preparation, having, as I understand, been practically completed. These will be submitted in accordance with instructions received from the department before October 1, 1917.

When all of these bathhouses shall have been constructed it will complete Bathhouse Row as outlined by the department some six years ago.

By reference to the tables showing the receipts, expenditures, and net profits of all the bathhouses receiving water from the reservation, it will be pleasing to note that there has been a marked increase in the business. This fact is of course encouraging to the bathhouse owners and furnishes an incentive to rebuild on the sites now occupied by the old frame houses, even though the prices of building have been materially increased within the past two years. I seriously doubt if the prices of construction will be decreased for some time to come, and it is believed that the sooner these new houses for which plans have been submitted are constructed the better it will be not only for the public generally but for the lessees as well.

The following tables showing the business of the bathhouses for the past fiscal year have been compiled from the monthly and annual reports submitted to this office by the various lessees:

Total receipts, less redemptions, of bathhouses, by months, for the fiscal year ended June 30, 1917.

Bathhouse.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Total.
Alhambra	$723.30	$828.80	$453.40	$573.55	$693.25	$615.65	$1,142.00	$940.35	$1,185.10	$825.90	$869.45	$690.50	$9,541.25
Arlington	822.50	1,190.90	944.35	977.60	1,415.65	1,428.10	3,604.40	4,744.40	4,096.15	2,805.20	1,599.95	1,452.60	25,081.80
Buckstaff	1,370.10	1,683.35	1,306.80	1,206.55	1,367.10	1,534.50	3,757.55	4,297.30	4,594.95	2,673.90	2,068.60	1,742.05	27,602.75
Eastman							1,035.03	3,757.58	4,272.23	538.46			9,603.30
Fordyce	1,918.70	2,668.51	1,169.49	1,800.75	2,038.05	2,465.70	4,592.30	6,586.45	6,037.45	3,254.40	2,337.47	2,348.12	37,217.39
Hale	780.85	968.10	698.60	818.95	878.55	973.90	2,121.15	2,521.60	2,671.75	1,654.50	1,541.25	1,585.10	17,214.30
Imperial	1,265.95	1,024.00	591.35	736.55	946.70	927.55	1,854.40	2,179.95	2,812.25	1,330.40	1,047.40	1,116.20	15,832.70
Lamar	1,022.85	965.50	684.60	769.10	1,066.15	1,003.05	1,762.20	1,941.85	1,629.45	1,340.75	1,341.10	958.90	14,485.50
Magnesia	1,296.20	1,138.20	1,009.60	862.25	1,064.95	939.65	1,644.25	1,344.85	1,496.15	1,279.20	1,095.25	1,016.85	14,187.40
Majestic	845.70	951.20	594.95	722.70	872.65	804.95	2,564.75	2,593.85	2,368.75	1,527.85	1,154.75	845.70	15,847.80
Maurice	2,126.80	2,080.00	1,622.70	1,821.85	2,011.50	2,589.45	5,714.00	6,254.40	5,910.20	3,052.75	2,551.05	2,685.45	38,420.15
Moody	670.24	731.26	364.61	337.05	360.37	400.50	1,039.32	1,311.98	1,301.80	396.86	586.35	340.02	7,840.36
Ozark	1,308.35	1,458.75	923.70	1,459.05	1,356.70	1,575.85	2,514.65	1,897.50	2,321.05	1,905.05	1,376.80	1,433.55	19,531.00
Ozark Sanatorium	411.05	424.78	278.65	229.40	218.10	265.35	487.25	525.20	734.40	384.90	418.60	426.65	4,804.33
Pythian (colored)	266.10	396.85	218.15	189.45	194.95	213.90	484.65	395.70	583.65	550.30	361.10	231.35	4,086.15
Rector	422.90	579.55	341.95	315.40	455.65	475.55	684.90	807.15	878.65	432.80	377.20	435.00	6,206.70
Rockafellow	1,149.02	1,373.15	974.46	803.57	864.32	784.85	1,526.17	1,669.97	1,890.08	1,309.52	1,191.83	1,080.96	14,617.90
St. Joseph's Infirmary	237.50	246.78	156.27	179.78	221.07	317.14	422.00	625.07	626.97	468.00	319.10	293.10	4,112.78
Superior	1,430.15	1,105.60	708.40	680.25	823.95	910.65	1,932.20	2,195.15	2,039.50	1,623.40	1,438.90	1,393.35	16,281.50
Total	18,068.26	19,815.28	13,042.03	14,483.80	16,849.66	18,226.29	38,883.17	46,590.30	47,450.53	27,354.14	21,676.15	20,075.45	302,515.06

Business of bathhouses for the fiscal year ended June 30, 1917.

Bathhouse.	Whole tickets.	Half tickets.	Quarter tickets.	Single tickets.	Total baths sold.	Baths redeemed.	Net paid baths.	Complimentary baths.	Paid for redeemed baths.	Total bath receipts less redemptions.	Receipts from massage, etc.	Total receipts.	Total expenditures.	Net profits.	Net loss.
Alhambra	1,066	645	120	1,500	30,936	3,145	27,791	126	$1,100.75	$9,428.75	$112.50	$9,541.25	$8,849.95	$691.30	.....
Arlington	1,417	1,527	.....	2,363	47,390	8,402	38,988	82	5,020.15	22,681.80	2,400.00	25,081.80	11,060.00	14,021.80	.....
Buckstaff	1,675	1,296	831	2,440	54,730	5,124	49,606	416	3,057.60	26,244.65	1,358.10	27,602.75	20,009.18	7,593.57	.....
Eastman	446	1,110	.....	1,197	21,663	2,795	18,868	.....	1,365.05	9,303.30	300.00	9,603.30	4,450.00	5,153.30	.....
Fordyce	2,089	1,154	909	3,433	63,387	9,030	54,357	220	5,418.37	31,532.08	5,685.31	37,217.39	17,431.17	19,786.22	.....
Hale	1,344	1,290	.....	1,875	42,999	4,497	38,502	3	2,023.15	16,815.35	398.95	17,214.30	12,516.74	4,697.56	.....
Imperial	1,112	890	386	1,042	35,224	3,480	31,744	606	1,740.00	15,368.10	464.60	15,832.70	11,633.27	4,199.43	.....
Lamar	1,166	1,192	521	1,202	40,213	4,148	36,065	86	1,659.05	14,019.85	465.65	14,485.50	8,448.75	6,036.75	.....
Magnesia	1,653	1,039	249	1,749	48,097	6,719	41,378	99	2,351.65	13,991.20	196.20	14,187.40	7,650.20	6,537.20	.....
Majestic	1,420	841	.....	1,338	39,568	7,478	32,090	28	3,593.10	15,547.80	300.00	15,847.80	10,536.91	5,310.89	.....
Maurice	2,591	1,439	1,013	1,548	75,414	8,707	66,707	42	4,788.85	35,341.20	3,078.95	38,420.15	23,280.56	15,139.59	.....
Moody	687	536	.....	1,032	20,819	3,026	17,793	.....	1,270.64	7,840.36	.....	7,840.36	4,250.90	3,589.46	.....
Ozark	2,177	1,585	872	2,440	68,367	10,737	57,630	447	3,757.50	19,531.00	.....	19,531.00	8,912.80	10,618.20	.....
Ozark Sanatorium	428	438	.....	798	14,166	1,866	12,300	.....	746.40	4,776.70	27.63	4,804.33	3,703.60	1,100.73	.....
Pythian (colored)	622	491	135	884	19,531	1,949	17,582	.....	348.05	3,106.95	979.20	4,086.15	5,140.00	.....	$1,053.85
Rector	581	388	285	725	18,231	2,217	16,014	189	887.05	6,204.20	2.50	6,206.70	4,716.85	1,489.85	.....
Rockafellow	1,288	1,114	.....	1,090	39,278	3,508	35,770	9	1,433.35	13,817.15	800.75	14,617.90	10,214.55	4,403.35	.....
St. Joseph's Infirmary	408	170	.....	53	10,321	815	9,506	93	350.72	4,112.78	.....	4,112.78	2,193.20	1,919.58	.....
Superior	1,320	957	559	1,251	41,336	4,316	37,020	445	1,927.25	16,020.50	261.00	16,281.50	12,247.32	4,034.18	.....
Total	23,490	18,102	5,880	27,960	731,670	91,959	639,711	2,891	42,838.68	285,683.72	16,831.34	302,515.06	187,245.95	116,322.96	1,053.85

Fees received by bath attendants in the bathhouses for the fiscal year ended June 30, 1917.

Bathhouse.	Gross amount.	Redemptions.	Net amount.
Alhambra	$4,480.50	$471.75	$4,008.75
Arlington	6,895.95	1,154.50	5,741.45
Buckstaff	7,958.25	768.60	7,189.65
Eastman	3,182.55	419.25	2,763.30
Fordyce	9,268.35	1,348.20	7,920.15
Hale	6,248.25	674.55	5,573.70
Imperial	5,116.80	522.00	4,594.80
Lamar	5,857.05	622.20	5,234.85
Magnesia	6,966.60	1,007.85	5,958.75
Majestic	5,722.20	1,084.30	4,637.90
Maurice	10,923.45	1,306.05	9,617.40
Moody	3,019.80	453.90	2,565.90
Ozark	9,928.50	1,610.55	8,317.95
Ozark Sanatorium	2,056.20	279.90	1,776.30
Pythian (colored)	2,836.35	292.35	2,544.00
Rector	2,647.50	332.55	2,314.95
Rockafellow	5,698.50	537.45	5,161.05
St. Joseph's Infirmary	1,486.95	122.25	1,364.70
Superior	6,002.40	648.45	5,353.95
Total	106,296.15	13,656.65	92,639.50

RECOMMENDATIONS.

In accordance with my recommendation last year, the sum of $10,000 from the revenues of the reservation was authorized by Congress in the sundry civil act approved June 12, 1917, to be expended under the direction of the Secretary of the Interior "for the employment of a landscape engineer and such other expenses as may be required, for the preparation of a practical and comprehensive plan, together with an accurate estimate of the cost thereof, for improving the Hot Springs Reservation."

Under this appropriation the firm of Mann & Stern, architects, of Little Rock, Ark., have been employed to perform this work, and they have entered upon the undertaking. Mr. Mann has been furnished with necessary data and plans from the files of this office, and every assistance possible is being rendered to facilitate the work.

It is believed that all of the improvements recommended in my last report should be included in the new plan, namely, the construction of a roadway at least 30 feet wide and 2½ miles in length through the "gorge" at the east end of Hot Springs and North Mountains; the paving of Fountain Street from Central Avenue to boundary monument No. 36, and Reserve Avenue from Central Avenue to boundary monument No. 26, this work to be done in such a manner as to provide that the property owners on the opposite side of these streets from the reservation bear their just share of the expense; the reconstruction of the Government free bathhouse; the construction of a new greenhouse; the construction of a storm sewer and surface drainage system in Hot Springs to care for the drainage from the reservation; and the construction of a sanitary sewer system in Hot Springs to care for the sewage from the reservation.

It is also believed that this plan should include the construction of a new main entrance to the Hot Springs Mountain Reservation from the promenade in front of Bathhouse Row, one that would be in keeping with other contemplated improvements. The present main entrance and band stand has been adequate until the present time, but is not now considered in keeping with other modern improvements. A new main entrance should be planned and constructed on an elaborate and extensive scale, and should have in connection a band pavilion of architectural design to correspond, in order to provide band music as a permanent feature of entertainment.

Also, it seems that the plan should include a magnificent drinking pavilion to be constructed on the reservation front, the architectural design and construction of which should make it a leading feature of this resort.

It will also be necessary to include in this plan modern comfort stations located at such points on the reservation as may be deemed advantageous for this purpose.

It is also recommended that, if consistent, the rules and regulations governing the Hot Springs Reservation be revised in accordance with my letter of May 7, 1917. If this can be accomplished it will provide a material increase in the revenues of the reservation.

CONCLUSION.

After a close study for the past three years of conditions pertaining to the Hot Springs Reservation, I feel sanguine that its standing throughout the country as a health-pleasure resort is firmly established. Each succeeding year has shown improvement, and the interest now taken by the National Park Service in promulgating circulars and literature will place its meritorious features before the public in such a manner as will impress upon their minds its true merit.

The efficacy of the waters can not now be denied and I feel assured, in view of the plans now being perfected for its improvement, that the next few years will bring about extensive improvement features which will greatly add to the general attractiveness and beauty of the park.

YELLOWSTONE NATIONAL PARK.

CHESTER A. LINDSLEY, Acting Supervisor, Yellowstone Park, Wyo.

GENERAL STATEMENT.

The Yellowstone National Park was set aside by act of Congress approved March 1, 1872 (secs. 2474 and 2475, R. S.; 17 Stat., 32), as a pleasure ground for the benefit and enjoyment of the people and placed under the control of the Secretary of the Interior. It is situated principally in northwestern Wyoming but laps over a little more than 2 miles into Montana on the north and almost 2 miles into Montana and Idaho on the west. Its dimensions are about 62 miles north and south and about 54 miles east and west, giving an area of about 3,348 square miles, or 2,142,720 acres. Its altitude is 6,000 to 11,000 feet.

The park was governed by civilian superintendents, assisted by a few scouts, from the time it was set aside until August 10, 1886, when troops of United States Cavalry were detailed to police it, the commanding officer acting as superintendent under direct orders of the Secretary of the Interior. On October 16, 1916, the troops were withdrawn from the park, and a civilian supervisor, with a corps of 25 rangers, for patrol and protection work, and a few civilian employees for other duties, were appointed by the Secretary of the Interior to replace them. Under recent legislation by Congress, troops were returned to the park on June 26, 1917. This action was necessary on account of a clause contained in the sundry civil appropriation act of June 12, 1917 (Public, No. 21, 65th Congress),[1] making appropriations for the park for the fiscal year 1918. By virtue of this law, the park supervisor was relieved of so much of the park duties as pertain to "protection."

Under orders from the War Department, the First Squadron of Seventh Cavalry, United States Army, under the command of Lieut. Col. E. M. Leary, took station in the park on June 26, 1917, and has since been responsible for the police and protection of the park. By mutual agreement the post of Fort Yellowstone was reoccupied by the troops, but the National Park Service has retained the maintenance and control of the telephone lines, the water and electric-light systems at Mammoth Hot Springs, and service from these is furnished without charge to other departments of the Government located in the park. Since the post had been abandoned, the troops arrived equipped only for field duty, and would have been in but poor shape for park duties had it not been for the fact that this department had on hand a considerable amount of property necessary for use in the buildings in the post of Fort Yellowstone and at the outpost stations (15 in number). They were also, and still are, unprovided with sufficient transportation to keep the outposts supplied, and some of the least important ones will have to be abandoned for the winter season.

Park headquarters are located at Mammoth Hot Springs, 5 miles inside the park line from the northern entrance. A telephone system connects headquarters with the various outposts. A civilian force is maintained by the National

[1] See page 1008. Excerpt from sundry civil act.

Park Service, sufficient to carry on the necessary work of park administration, including the office of the park supervisor, maintenance and care of the tame buffalo and other animals in the park, maintenance of telephone lines, water and light systems, sanitation, fire lanes, and such buildings as are necessary in connection therewith.

The maintenance and construction of roads, bridges, and improvements in the park is carried on by special appropriation under the War Department, the work being locally in charge of an officer of the Engineer Department of the Army, who reports directly to the Chief of Engineers. There are 278.8 miles of main road and 24.75 miles of secondary road in the park, and 106.5 miles of main road is maintained by the same department in the forest reserves adjoining the park.

TRAVEL.

While automobiles were admitted to the park on August 1, 1915, they were not in general use as a method of transportation by the regular companies during the seasons of 1915 and 1916, although many private cars passed through, and they were quite generally used by concessioners and different branches of the Government operating in the park, in connection with the handling of their business. But beginning with the season 1917, practically all of the transportation of tourists in the park was consolidated under one company, which was given authority to use automobiles for this purpose. As a substitute for the antiquated coaches and other horse-drawn vehicles formerly used for this business, the automobiles have proven a grand success.

The regular tourist season was fixed from June 20 to September 15, and while it opened on schedule time, from the north and west entrances it was impossible to make the trip over the Continental Divide between Upper Basin and the Lake Outlet, via the Thumb of the Lake, on account of the very late spring following a winter of unprecedented rigor accompanied by deep snows. The appropriation act providing funds for the maintenance of park roads specifically prohibits the use of the money for clearing the roads of snow, so in case of a late spring the burden of opening the roads falls upon the transportation company. The Yellowstone Park Transportation Co. exerted every reasonable effort to clear the roads of snow in time for the opening of the season, and expended quite a large sum in the work; but regardless of this fact, the snow on the road between Upper Basin and Lake Outlet was not shoveled out so a vehicle could pass over it until June 23, and it took until the 26th to repair the bridges so that the regular travel could be routed that way. Until that time it was necessary for tourists to go from Upper Basin to Canyon and Lake via Norris. The eastern entrance was not opened for travel until July 9, but could have been opened several days sooner had the bridge across Pelican Creek been repaired so the snow-shoveling crew could have gotten through to shovel out the divide. Dunraven Pass was opened on July 9, and regular travel was routed that way on July 10. Much heavy snow shoveling was done by the transportation company between Norris and Canyon, and Canyon and Lake, in order to get the road opened so the main points of interest could be reached by June 20. One of the most interesting features of the park trip up to the middle of July was the big snowdrifts through which the automobiles passed in several places on the park trip. In order that they might take their patrons to the points of interest advertised in their schedules, the transportation company, on June 25, made some slight repairs to the side roads leading to the Mammoth Hot Springs formations and to the pasture where the tame buffalo are kept for exhibition to tourists.

Tourists who visited the park before it was possible for them to be taken over all of the regular route showed disappointment in some cases, but for the most part they appreciated the reasons after seeing the snow banks, and were satisfied that the conditions were unavoidable.

The aggregate number of persons making the park trips during the season of 1917 was as follows:

Yellowstone Park Transportation Co.:		
Entering via northern entrance	5,774	
Entering via western entrance	5,635	
Entering via eastern entrance	1,874	
		13,283
With other licensees of personally conducted camping parties		67

Making park trips with private transportation:		
With automobiles, paid and complimentary	19,832	
With automobiles, second trip	1,436	
	21,268	
With other private transportation, as "private camping parties"	647	
		21,915
Miscellaneous short trips		135
Grand total		35,400

The Yellowstone Park Hotel Co. reports that 131,156 meals and 42,061 lodgings were served at the hotels in the park during the season, as follows:

Hotels.	Total full-paid meals.	Total full-paid lodgings.
Mammoth	29,681	10,024
Old Faithful	39,109	11,019
Lake	20,992	8,670
Canyon	41,374	12,348
Total	131,156	42,061

The Yellowstone Park Camping Co. reports that 98,428 meals and 34,878 lodgings were served at the camps in the park during the season.

Travel by different entrances.

From the north, via Gardiner, Mont	13,419
From the west, via Yellowstone, Mont	14,690
From the east, via Cody, Wyo	6,666
From the south, via Jackson, Wyo	356
From the northeast, via Cooke, Mont	269
Total	35,400

Private automobile travel.

	Automobiles.	Tourists.
Entering via northern entrance	1,994	7,379
Entering via western entrance	2,258	8,631
Entering via eastern entrance	1,304	4,727
Entering via southern entrance	98	328
Entering via northeastern entrance	49	203
Total	5,703	21,268

A fee of $7.50 was charged for tickets of passage, which were good for the entire season. Complimentary tickets were issued to officials of adjoining States or counties, and to officials of the Federal Government, visiting the park officially.

AUTOMOBILE TRAVEL BY STATES.

A statement showing the automobile travel, by States in Yellowstone National Park for the season of 1917 follows:

Travel in Yellowstone National Park, by States, for the season of 1917.

State.	North entrance.		West entrance.		East entrance.		South entrance.		Totals.
	Private.	Yellowstone Park Transportation Co.	Private.	Yellowstone Park Transportation Co.	Private.	Yellowstone Park Transportation Co.	Private.	Yellowstone Park Transportation Co.	
Alabama		4	7	14	6	10			41
Arkansas	9	14		5	15	26			69
Arizona		4	29	20	20				73
California	183	182	357	392	92	21	15		1,245
Colorado	55	38	89	66	334	72	15		669
Connecticut	5	47		31		9			92
Dist. of Columbia		17		23		3			43
Delaware		5		3					8
Florida	12	2		19	5	3			41
Georgia		13	5	26		2			46
Idaho	118	16	2,622	133	18	3	33		2,973
Illinois	85	609	35	341	132	200			1,402
Indiana	20	111	18	79	26	36			290
Iowa	188	225	45	173	207	106			944
Kansas	62	63	82	132	290	52			681
Kentucky		32		46	8	19			105
Louisiana		17		21		2			40
Maine		7		4		2			13
Maryland		16		11		5			32
Massachusetts	10	97	2	73	8	20			210
Michigan	27	38	16	63	30	30			204
Minnesota	208	225	8	21	33	21			516
Mississippi		6		5	6	8			25
Missouri	54	85	38	129	132	168	3		609
Montana	4,622	429	2,031	16	501	25	2		7,626
Nebraska	109	80	81	137	349	139	19		914
Nevada		1	52	17			4		74
New Hampshire		6		8		4			18
New Jersey	6	74	5	86	7	25			203
New Mexico	2	3		11	21				37
New York	24	360	6	333	9	111			843
North Carolina		6		2		1			9
North Dakota	346	212	10	6	47	2			623
Ohio	47	237	4	191	53	94			626
Oklahoma	67	40	62	44	242	52	5		512
Oregon	57	74	329	31	23	8	3		525
Pennsylvania	21	109	11	197	36	73			447
Rhode Island	3	6	5	5		1			20
South Carolina		5		5					10
South Dakota	144	44	5	16	113	25	10		357
Tennessee		34		23	4	14			75
Texas	28	70	49	140	146	49			482
Utah	8	15	1,545	199	24		34		1,825
Virginia	3	23	6	7		9			48
Vermont			7	2					9
Washington	408	154	266	19	56	2			905
West Virginia	4	23		24	8				59
Wisconsin	81	253	7	55	20	20			436
Wyoming	214	18	84	12	1,174	67	55		1,624
Countries.									
Australia		1		1					2
Canada	75	33	34	18	4	1			165
China		4							4
Cuba		4							4
Denmark				2					2
England		1		1		2			4
France		2		2					4
Hawaii		2	8	7					17
Holland		13		4					17
India		2							2
Japan		3		2					5
Java				16					16
Mexico		4		1	2				7
Philippine Islands		4							4
Russia		2		1					3
Sumatra				1					1
Sweden				1					1
Switzerland		1							1
South America		2		2					4
Total	7,338	4,227	7,960	3,475	4,201	1,542	198		28,941
Unclassified									6,459

NOTE.—It was impossible to get the addresses of several of the large parties carried by Yellowstone Park Transportation Co., and many of the smaller parties were omitted.

In addition to the transportation furnished by the regular company, movable-camp licenses were issued during the season covering a total of 9 wagons and 56 saddle horses.

COMMENTS ON THE AUTOMOBILE TRAVEL.

As will be noted by the above travel report, about three-fifths of the total travel to the park came in private automobiles. The schedules, which previously have had to be very strict to protect horse-drawn vehicles, were made as liberal as possible, safety considered. The regular park tour was made to include the trip from Canyon to Mammoth through Dunraven Pass instead of returning to Mammoth via Norris, as heretofore, and automobiles were required to travel around the loop in the direction opposite to that followed by the hands of a clock. On the approaches, and on the loop, at times when but little traffic would be encountered, they were permitted to travel in either direction. The cars of the regular transportation company ran as nearly as practicable on schedule. For the most part, the trips between points of interest were made before noon, leaving the afternoons for sight-seeing. The lunch stations of the hotels and camps, heretofore made necessary on account of some of the long drives between stations, were eliminated, as it is now possible to reach the main hotels or camps before noon. Many of those who traveled in their own cars stopped at the hotels and camps, and others carried with them their own camping outfits and made use of the shelters and conveniences provided for them at various points.

Special permits for operating automobiles to take care of the necessary traffic between Gardiner and Cooke, Mont., through the park, were given as follows: Nels E. Soderholm, for operating one 2-ton truck; Robert I. McKay, for operating one truck and one touring car; Frank Lind, in connection with mail contract, one automobile.

Motor cars and trucks have been in general use in the park by concessioners and different branches of the Government, in connection with all necessary business.

CONCESSIONS.

In January, 1917, the National Park Service effected a complete reorganization of the hotel, permanent camp, and transportation concessions in the park, and new contracts were made, practically on a profit-sharing basis with the Government. Under the new contracts, a close supervision of the business of the concessioners is maintained.

The Yellowstone Park Hotel Co. operates all of the hotels in the park, as heretofore, but under a new contract on terms which give the National Park Service authority to regulate the business. The management of the hotels was greatly improved and the service was excellent. The substituting of automobile transportation for the stages in use last year did away with the necessity for maintaining lunch stations at Norris and Thumb, and the Fountain Hotel was also abandoned, leaving but four hotels, namely, at Mammoth Hot Springs, Upper Basin, Lake, and Canyon.

The two systems of permanent camps were combined into one called the Yellowstone Park Camping Co., and the general transportation privilege was withdrawn and the whole transportation business vested in one company. The camps, however, are still permitted to furnish saddle horses and surreys for short trips from camps for their patrons. This combination of interests, together with the new and more rapid method of transportation employed, permitted the abandonment of 10 permanent camp sites—at Swan Lake, two at Gibbon Junction, Willow Park, Nez Perce Creek, Upper Geyser Basin, Thumb, Lake Outlet, Canyon, and Tower Falls. A new camp was constructed at Mammoth Hot Springs to replace the two that were abandoned at Willow Park and Swan Lake, and old sites were retained at the western entrance, Upper Geyser Basin, Lake Outlet, Grand Canyon, and Tower Falls, making a total of 6 permanent camps in all to take the place of 15 heretofore maintained. Much improvement work has been done on the camps that were retained on plans approved by the National Park Service. Expansion to accommodate the travel heretofore taken care of by two systems of permanent camps was necessary at the principal points of interest, namely, Mammoth, Upper Basin, Lake, and Canyon. The work of consolidation, reconstruction, and expansion has been going on ever since the ground was cleared from snow, and there is still much

to do. Good progress has been made, however, taking into consideration the fact that labor has been difficult to obtain. The service at the camps was excellent; they were well patronized by parties traveling in private automobiles as well as by regular travel, and complaints were few. The camp at Grand Canyon is particularly well located, in the center of the interesting features of the canyon. It has been crowded during the entire season and has proven to be one of the most popular stopping places in the park. The work of improving these camps by installing electric lights, excellent running water, amusement rooms, and other comforts and conveniences is still in progress, and they will eventually be models in their line.

The transportation lines in the park were consolidated into one company, the Yellowstone Park Transportation Co., which was authorized to use automobiles in place of the horse-drawn surreys and Concord coaches formerly in use. One hundred 10-passenger and sixteen 7-passenger automobiles of a specially comfortable type were purchased by this company for the park work. The change from horse-drawn to motor-propelled vehicles has been satisfactory in every respect. From a point of comfort there is no comparison, and a vast amount of time is saved in traveling, which is utilized by the tourist in sightseeing. For the first time the schedules are so arranged that travelers may leave the park by any route they prefer, regardless of the route by which they enter, without additional charge for stage fare, and considerably more distance is covered in making the regular trips than heretofore. The company maintained a daily service through to Cody, Wyo., 55 miles outside of the park, and provided for tourists desiring to go to Jackson Hole, south of the park. In addition to furnishing transportation to park travelers, the transportation company has also established garage and automobile repair facilities in the park for the benefit of parties traveling in their own cars. One of the barns at Mammoth Hot Springs has been remodeled into a garage 50 by 200 feet in size, a garage of the same size has been built at Upper Geyser Basin, and others are to be built as soon as possible at Lake, Canyon, and Yellowstone.

With the advent of the automobile transportation, the necessity for providing water transportation between Thumb and the Lake Outlet for regular tourists, which formerly saved time and was restful after a long stage ride, ceased to exist, and the Yellowstone Park Boat Co. confined its operations during the past season to short excursions from the Lake Outlet, for fishing, picnic parties, etc. One of the 45-foot motor boats and the small gasoline and row boats were all that were required. The boat company's store at the Lake Outlet was sublet to Mr. C. A. Hamilton, who ran it as a branch of his main general store at Upper Geyser Basin.

Mr. George Whittaker was permitted to establish a branch store at Grand Canyon, using for the purpose some old log buildings near Canyon Junction, formerly used by the Holm Transportation Co. This was done as an experiment in connection with his general store at Mammoth Hot Springs. The results justify making it permanent.

Mr. J. E. Haynes, who holds a concession in the park for manufacture and sale of photographs, etc., operated his picture shop at Upper Geyser Basin and also had stands in the principal hotels and camps. During the latter part of the season he established a picture shop at Tower Falls as an experiment. This is located at a very interesting point, and as he has agreed to furnish a free information bureau in connection with his picture shop, this combination is desirable, for there is no other source of information at this remarkably interesting point.

The bathhouse operated at Upper Geyser Basin under the concession of Francis F. Brothers was fairly well patronized during the season. The baths were used by 4,852 persons, of whom 3,171 were tourists and 981 were park employees.

The Park Curio Shop, operated at Mammoth Hot Springs by Mesdames A. K. Pryor and Elizabeth Trischman, did an excellent business.

A special permit was issued to Dr. H. O. Reik, of Baltimore, Md., to give lectures illustrated by natural colored lantern slides. He gave a few lectures at the Lake Outlet as an experiment, and while the lectures and slides were excellent in every way they failed to attract sufficient interest to make it a financial success, and they were discontinued.

A special permit was issued to Jay Wilcox and Jim Parker, of Gardiner, Mont., to cultivate a tract of 1 acre of land in the park, about 2 miles up the Yellowstone River from the north entrance, for the purpose of raising potatoes.

The land was new and had never been plowed. The crop has not yet been harvested.

The season's travel proved much better than was anticipated when it opened. The concessioners showed a splendid spirit of cooperation and strove to make the service better than it had ever been before. Complaints were not numerous, and when they were made the source of complaint was promptly removed, if possible to do so. The travel by private automobiles is increasing noticeably, and a large percentage of those so traveling put up at the hotels and permanent camps. Those desiring to furnish their own accommodations in camp are given every encouragement and possible facility for making themselves comfortable and are given to understand that they are entirely welcome. Every effort is made to cultivate the feeling among visitors that the national parks belong to the American people, that those in authority are the servants of the public, and that the parks are run for their benefit and not in the interests of the concessioners as has often been claimed.

STREAM GAUGING.

This work in the park is under the direction of the district engineer of the water-resources branch of the United States Geological Survey, whose headquarters are at Boise, Idaho, who has furnished the following report on the work for the year:

The installation of a water-stage recorder and of cable-measuring equipment at the gauging stations on Yellowstone River begun during September, 1916, was completed during the following month. This station is situated about one-quarter mile above the Upper Falls of the Yellowstone, and is readily accessible to tourists. On this account a special attempt was made to give the gauge house an attractive appearance; windows were placed in all four sides and a substantial platform, with rustic railing and two benches, was constructed around the house.

Cable-measuring equipment was also installed at the gauging stations on Snake and Madison Rivers during the summer of 1917.

The station on Gibbon River was discontinued at the close of the 1916 tourist season because of inability to longer secure frequent gauge readings. The other three stations, mentioned in previous reports, are still being maintained, and with the equipment installed during the past year dependable data should be obtained for practically all stages of flow.

It is hoped that funds will be provided in the near future with which to install a water-stage recorder at the Snake River station, and also to equip and maintain a station on Fall River, in the southwest corner of the park, the latter being of special importance because of possibilities for storage for irrigation use.

Most of the construction work above outlined was made possible through the allotment of $1,000 from Yellowstone Park funds for the fiscal year ending June 30, 1917. Unfortunately, however, no funds are available from this source for the continuation of this work during the present fiscal year. A small sum has been set aside by the Geological Survey, but this is inadequate for the needs of the work, and unless materially supplemented from other sources will prevent any further construction or expansion.

Detailed descriptions of the gauging stations, together with summaries of current meter measurements, and gauge height and discharge data for each, will be furnished in the annual Water-Supply Papers of the United States Geological Survey, Parts VI and XII, respectively, for Missouri and Snake River drainage areas.

ROADS.

The road work in the park has been taken care of in a very commendable manner since July 15 by Capt. John W. N. Schulz, Corps of Engineers, United States Army. As with other departments of the Government, concessioners, and others, who have much to do with the employment of labor, the scarcity of competent male help, due to the selective draft and the general prosperity of the country, rendered it more difficult and expensive to do this work than heretofore. Capt. Schulz has kindly given me the following notes on the work accomplished by his department during the past year.

The sundry civil act of June 12, 1917, appropriated money as follows for road work in Yellowstone National Park and the adjacent forest reserves on the east and south:

"Yellowstone National Park: For maintenance and repair of improvements, $147,500, including not to exceed $5,000 for maintenance of the road in the forest reserve leading out of the park from the east boundary, and not to exceed $7,500 for maintenance of the road in the forest reserve leading out of the park from the south boundary, and including not exceeding $3,000 for purchase, operation, maintenance, and repair of motor-driven and horse-drawn passenger-carrying vehicles to be used for inspection of roads and road work, to be expended by and under the direction of the Secretary of War: *Provided*, That no portion of this appropriation shall be expended for the removal of snow from any of the roads for the purpose of opening them in advance of the time when they will be cleared by seasonal changes.

"For resurfacing and for finishing the belt line with oil macadam, $20,000."

In addition there remained available on October 1, 1916, about $69,000 of the $197,200 appropriated by the sundry civil bill of July 1, 1916 (p. 30 report of Superintendent of National Parks, 1916), for maintenance and repairs in the park and forest reserves, and for widening, surfacing, and otherwise improving the west, south, and east entrance roads, including the road in the east forest reserve.

Owing to the very early snows and cold weather in the fall of 1916 and to the very late spring of 1917, following the worst winter existing within the records of the Weather Bureau, which cover a period of some 29 years, it was impossible to complete the work of improving the three entrance roads inside the park during the fiscal year 1917, as was contemplated. An amount of $9,415.61 of the funds appropriated especially for the entrance roads inside the park therefore remained unobligated on June 30, 1917; and, in the natural course of events, will have to be returnnd to the Treasury. This money is very badly needed for the purpose for which appropriated, the original amount having been barely enough to do reasonably well the work proposed; and it is hoped that the remainder reverting to the Treasury will be reappropriated in the appropriation act for the fiscal year 1919, plus an amount of 33⅓ per cent additional to cover the very material increase in the cost of all elements entering into the work since the time when the original estimate for the improvement of the three approach roads was made.

The work during the present year included general repair and maintenance of the entire road system, including the belt line, the north, west, south, and east approaches, both in the park and in the forest reserves on the east and south, and the Cooke City road; widening and improving the west, south, and east approaches, including the east forest reserve; sprinkling approximately 99 miles of the belt line and the north and west approach roads; repair and construction of bridges; construction of concrete, wood, and galvanized-iron culverts; reshaping and ditching roads; alterations, repair, and construction of landing platforms and board walks at points of interest; and maintenance of trees, shrubs, vines and lawns.

In the following summary the work will be divided into that done on the belt line, the north approach, the west approach, the south approach, the east approach, and the Cooke City road.

Belt line.—*Spring repairs.*—The repair work done during the present spring consisted almost entirely of emergency work, most of which was urgently needed to keep the road system open at critical points. The winter of 1916–17 was one of the severest within the memory of the older inhabitants of the park. The official Weather Bureau records at Mammoth Hot Springs, the headquarters of the park and practically the only point in the park which is accessible to the outside world in the winter, show that for two whole months the temperature at that place was not once as high as the melting point, 32° F. As late as May 1 there was an average depth of snow on the main road system of 35 to 40 inches, and the melting of snow in the interior of the park did not occur to any large extent until almost June. The melting of snow during the month of June throughout the portions of the park adjacent to the belt line was very great, the snow belt receding from the vicinity of the Golden Gate, 3½ miles from Mammoth Springs, so that at the end of the month practically all the belt line was free of snow, with the exception of a few drifts on the Continental Divide Road and the remains of one very heavy drift on the Canyon-to-Lake Road. At the end of June the south approach, the east approach, and the Dunraven Pass and Mount Washburn Roads were still blocked by snow.

The melting of snow caused practically all streams to be flooded, sometimes beyond their banks, in many cases requiring prompt and energetic action to

MAP OF YELLOWSTONE NATIONAL PARK.

⊕ Denotes Ranger Station ← Direction of Travel

Distances given are between main points by road.

keep the roads open to traffic and to prevent serious damage to the roads. Numerous small breaks and bad mudholes in the roads did occur, but were promptly repaired as the snow belt receded. Small crews were organized as necessary to cope with these situations, and also with the very serious conditions of the roads in the localities where auto and truck traffic began just as soon as the snowdrifts had been cut through. Many minor breaks occurred in the road system, due to the incapacity of the small culverts to care for the unprecedented amount of water from the melting snows. All of these breaks were either temporarily bridged over or refilled, with practically no interruption to traffic.

The wear and tear on the roads caused by the automobile and truck traffic while the roads were still covered by or still wet from the winter's snow, the depth of which and the late melting of which were almost unprecedented, caused a very heavy demand on the resources of the Engineer Department to cope with the situation. So many points on the road system were in serious danger of being closed entirely to traffic that practically all energies had to be devoted to critical points where work was absolutely necessary to keep the road from being seriously damaged or to keep the road open to traffic. Many minor evils in the roads, such as chuck holes and ruts, had to be temporarily omitted from consideration, leaving all polishing work to be done during the month of July. Even the more serious and critical work, in the case of the roads which on July 1 were still closed by snow, had to be held over until the new fiscal year.

General road repairs.—During the early portion of July the small emergency crews which had been organized for spring repair work in June were expanded into larger flying-grader crews, and several additional crews of this nature were organized. The flying-grader work done during the present season has necessarily been much heavier in its nature, and more expensive per mile than any attempted in previous seasons. This is due to the terrific wear and tear on the roads by the heavy automobile traffic, and the fact that automobiles are much more demanding of a perfect road than were the horse-drawn vehicles formerly used in the park. In this connection it is deemed proper to state—inasmuch as the main belt line system was the subject of some criticism during the early part of the tourist season on the part of tourists passing through the park and others—that the improvement of the belt line in order to make the same suitable for automobile traffic, as recommended by the Engineer Department in Senate Document No. 871, Sixty-second Congress, second session, in 1912, has never yet been carried into effect, the Congress not having seen fit to appropriate any portion of the funds recommended for the belt line in that report until June 12, 1917, the sundry civil bill of which date provided sufficient funds for improving approximately 1½ miles of the belt line during the fiscal year ending June 30, 1918.

The progress of the flying-grader crews around the belt line was a great deal slower than in previous years, due to the very heavy work required, so that certain portions of the belt-line system were not reached until late in the tourist season, notwithstanding the fact that there have been more than twice as many crews engaged in this class of work the past season as in the past two years. The work done by these crews consisted of recrowning the roads, removing ruts, repairing chuck holes, refilling and leveling up over culverts where old fills had sunken in, leveling up approaches to bridges so as to eradicate sudden drops either in going onto or off of bridges, repairing minor or dangerous breaks in retaining or guard walls, repairing dangerous breaks in road shoulders and dangerous flooring in bridges, repairing broken-down culverts or replacing same, cleaning out ditches and culverts which had become clogged, and removing rocks and bowlders from the roads. The work was made more difficult due to the extremely dry weather. While in all cases the roads were improved by the work done, except that they were sometimes made extremely dusty at the immediate time the work was being done, yet it does not take many days after the passage of such a crew over a section of road before old chuck holes recur or new ones are formed by the heavy automobile traffic.

To assist in maintaining the roads during the tourist season each sprinkler crew was equipped with a split-log drag, and whenever rainy weather—which was more rare during the season of 1917 even than during the preceding season of 1916—gave an opportunity for so doing, these drags were used to reshape and smooth out the ruts in the roads. This process is very necessary and would have been more efficacious had there been more rain than was the case during the season just closed.

During the season of 1917 there was also established a system of patrol maintenance over about 24 miles of the road system, where especially needed because of unusually heavy traffic, the work consisting principally of dragging the road and of filling in chuck holes. Where reliable men can be obtained the expense incurred in this class of work is well repaid in the improvement of the road. The dragging was done immediately after the roads were sprinkled, while the road surface was still in the best condition as to moistness.

Sprinkling and dragging.—During the tourist season of 1917 approximately 99 miles of road was sprinkled, covering practically the same stretches of road as the previous season, with the exception of the road between Norris and Canyon. Owing to the extremely dry weather, it appeared during about the first 20 days of July that the sprinkling system would be unable to sufficiently cope with the extreme dustiness of the roads, but a rain on July 22 helped out materially in this respect, and after that time the sprinkling was very effective.

As practically all tourist traffic from Canyon to Mammoth Springs now travels by way of the Dunraven Pass and Tower Falls road, instead of by Norris, the sprinkling of the Canyon-Norris road was not attempted during the season just closed. Attempts to sprinkle this section of the road in previous seasons were never entirely successful, as for more than half the distance dependence had to be placed on wells for securing the water supply, and these wells have always gone dry during the latter part of the sprinkling season. Due to the inefficiency of this particular sprinkling, and to the fact that comparatively little tourist travel now passes over this road, it was thought best not to undergo the expense of sprinkling it.

As already stated under "General road repairs," all sprinkler crews were equipped with split-log drags, which were used for the purpose of reshaping and smoothing out the roads whenever rainy weather—which was rare—gave an opportunity for doing so.

Firehole realignment.—This realignment, which will replace 1½ miles of the road leading from Madison Junction to the Firehole Cascades, was begun in June, 1915, and completed for a distance of about 4,700 feet during the seasons of 1915 and 1916. During the year ending September 30, 1917, about 1,000 additional feet of road has been practically completed, making a total of about 5,700 feet; and partial work has been done over an additional distance of about 800 feet. It was hoped that this realignment, the total length of which is about 7,700 feet, would be completed during the present season, but due to the vastly increased costs of all the elements entering into the work it will not be possible now to complete the work with this year's appropriation. The completion of this project will therefore have to remain over until the next working season.

Resurfacing belt line and finishing with oil macadam.—During the summer just closed work has been begun on the project of resurfacing the main belt line and finishing it with oil macadam, under a special appropriation of $20,000 for beginning that work. To the present date approximately three-fourths mile of road between Norris and Mammoth Hot Springs, 2¼ miles from Norris, has been widened, straightened, and regraded so as to prepare a proper subgrade for the resurfacing work to be done, and about one-half mile of rock base has been laid and rolled preparatory to receiving the oil finish.

It is hoped that in future years, at least after the termination of the present war, larger amounts of money will be appropriated for this work, so that the improvement of the belt line can be carried on at a rate of about 15 miles per year, permitting the completion of the project in about 10 years.

Oil-macadam finishing is the only practicable way for handling the dust nuisance in the park. In some portions of the park where water is scarce or altogether missing sprinkling is impracticable, and even in some places where the roads are sprinkled the sprinkling amounts only to an amelioration and not a cure of the dust nuisance.

The rock base laid during the present summer has been for the most part 16 feet wide and 7 inches in depth before rolling. Owing to the high cost of the work, on account of the large increase in all construction costs and on account of the long haul, it has been found necessary to reduce these dimensions at present to 14 feet and to 6 inches, respectively, for the work now being done.

Bridges and culverts.—In line with the policy adopted several years ago of reconstructing in permanent material the bridges and culverts on the main belt line, there were built during the year ending September 30, 1917, reinforced concrete culverts on the main belt-line road, as follows:

One culvert 4 by 2¼ by 84 feet, at mile 1.05 from the Lake Hotel toward the Thumb, to replace a high wooden bridge; approximately 3,700 cubic-yard fill completed and placed in commission.

One culvert 4 by 2¼ by 84 feet, at mile 9.5 from the Lake Hotel toward the Thumb, to replace a high wooden bridge; approximately 4,000 cubic-yard fill completed and placed in commission.

One culvert 4 by 2¼ by 30 feet, opposite the fish hatchery, mile 0.25 from the Lake Hotel toward the Thumb; 90 cubic yard fill completed and placed in commission.

One culvert 4 by 2¼ by 30 feet, opposite the Lake Soldier Station, mile 0.5 from Lake Hotel toward Canyon; placed in commission.

One culvert 4 by 2¼ by 42 feet, over Cascade Creek, mile 3.6 from Canyon toward Tower Falls, to replace a high wooden bridge; 1,600 cubic yard fill practically completed and placed in commission.

One culvert 4 by 2¼ by 42 feet, mile 4.55 from Canyon toward Tower Falls; 600 cubic yard fill practically completed and placed in commission.

One culvert 4 by 2¼ by 30 feet, mile 4.9 from Canyon toward Tower Falls; 500 cubic yard fill partially completed.

One culvert 4 feet by 1 foot 7 inches by 18 feet, mile 5.3 from Canyon toward Tower Falls; 50 cubic yard fill completed and placed in commission.

One culvert 4 by 2¼ by 24 feet, mile 5.35 from Canyon toward Tower Falls; 100 cubic yard fill partially completed.

The following culverts have been constructed (generally to replace high wooden bridges) on the Dunraven Pass road, but have not yet been back filled:

One culvert 4 by 2¼ by 42 feet, mile 7.7 from Canyon toward Tower Falls.

One culvert 4 by 2¼ by 30 feet, mile 7.8 from Canyon toward Tower Falls.

One culvert 4 by 2¼ by 42 feet, mile 8.3 from Canyon toward Tower Falls.

One culvert 4 feet by 1 foot 7 inches by 48 feet, mile 8.35 from Canyon toward Tower Falls.

One culvert 4 feet by 1 foot 7 inches by 54 feet, mile 8.4 from Canyon toward Tower Falls.

One culvert 4 by 2¼ by 54 feet, mile 8.8 from Canyon toward Tower Falls.

One culvert 4 by 2¼ by 42 feet, mile 8.9 from Canyon toward Tower Falls.

The following work of back filling culverts constructed in previous years was done the past year and the culverts have been placed in commission:

One 160 cubic yard fill over an 8 by 4 by 21 foot reinforced concrete slab culvert built in 1916, mile 1.5 from the Thumb toward the Lake.

One 75 cubic yard fill over an approximately 6-foot span reinforced concrete culvert built in 1915, mile 1.75 from the Thumb toward the Lake.

One 350 cubic yard fill over a twin galvanized-iron culvert, 24 inch diameter each, 44 feet long, built in 1916, mile 2.5 from the Thumb toward the Lake.

One 250 cubic yard fill over an 8 by 8 by 20 foot reinforced concrete slab culvert over Antelope Creek, built in 1916, mile 10.2 from the Lake Hotel toward the Canyon.

One 250 cubic yard fill over the 8 by 10 by 20 foot reinforced concrete slab culvert, built in 1916, over Trout Creek, mile 10.5 from the Lake Hotel toward the Canyon.

One 600 cubic yard fill over an 8 by 10 by 20 foot reinforced concrete slab culvert, built in 1916, over Alum Creek, mile 13 from the Lake Hotel toward the Canyon.

There were also installed some galvanized-iron culverts at various points on the belt line in connection with the flying-grader work described heretofore. In addition, a number of culverts and minor wooden bridges were repaired, strengthened, or reconstructed. The steel bridge over Obsidian Creek, mile 7.5 from Mammoth Hot Springs toward Norris, and the wooden truss bridge over the Firehole River, mile 0.5 from the Upper Basin toward the Thumb, were refloored with plank.

NORTH APPROACH.—On the north approach road, extending from the northern entrance at Gardiner, Mont., to the belt line at Mammoth Hot Springs, general maintenance and repair work was done, as on the belt line road itself, and the first 3½ miles from Mammoth Hot Springs toward Gardiner was sprinkled. The other mile and a half of the road had been treated with a light oil and sand finish in the spring of 1915 and did not require sprinkling during the season just closed.

Gardiner slide.—The Gardiner slide, located on the north approach road about 2 miles from the northern entrance to the park, which has given considerable trouble for a number of years, has become rapidly worse during

the year just closed, both in the extent of territory which it covers and in the rate or velocity of the gradual sliding. A very large amount of work has had to be done on this slide during the fall of 1916 and during the present spring to keep the road open; and the expense involved in this work is becoming so great as to make urgent a realignment of this road, in the early future, with a view to eliminating the troubles caused the present road by the slide.

WEST APPROACH.—On the west approach road, which extends from the western entrance at Yellowstone, Mont., to the belt line at Madison Junction, a distance of 13½ miles, maintenance work similar to that on the belt line, including the sprinkling of the 4 miles nearest to Madison Junction, was done. In addition, the work of improving the road to make it suitable for animal-drawn and motor-propelled vehicles was prosecuted as vigorously as possible until the close of the fiscal year on June 30, when the appropriation expired by limitation and the balance of unobligated funds reverted automatically to the Treasury. As heretofore stated, the very early winter in the fall of 1916 and the late spring of the present year made it impossible to do all the work projected before the end of the fiscal year.

The improvement work accomplished during the year was the construction of a crushed rock base 5 inches deep and 10 feet wide, ready to be given an oil finish, over a distance of 2 miles, reaching a point about 9½ miles from the west entrance at Yellowstone. An oil finish was applied over the 2 miles mentioned, and also over the 2½ miles (from the 5 to the 7½ mile points from Yellowstone) of base laid in the season of 1916.

The narrowing of the oil macadam from 18 to 10 feet was made because the experience prior to the present season showed that practically all traffic on the first 5 miles of the west approach, during 1915 and 1916, was concentrated on the 10-foot strip; and the expense of the greater width in further construction on the west approach, at least for the time being, was not considered justified. The experience the present season, however, has been different, due to the almost complete change the present season from horse-drawn to motor-propelled vehicles. The tendency of automobile travel is to spread more over the width of the road, instead of remaining in a single track, as is the case with team travel, so that with the narrower width the traffic often extends beyond the sides of the paved strip, resulting in considerable ravelling which would not occur with a wider surface. For this reason it is considered necessary for future work, whenever funds permit, to increase the width of the surfaced road to 14 feet, or if possible to 16 feet.

SOUTH APPROACH IN THE PARK.—In addition to general repairs such as were made on the belt line, the work of widening and improving the south approach for combined horse-drawn and automobile traffic, as specially appropriated for by Congress, was continued as late in the fall of 1916 as weather conditions would permit. No work was possible on this section during the present spring, as the road was closed by snow until about the middle of July. At this time the widening and improving of the road is completed except for about 2 miles of road (the 14 to the 16 mile points south of the Thumb). The work will not be completed until the funds therefor are reappropriated by Congress, the funds available during the fiscal year 1917 having expired by limitation on June 30, 1917.

SOUTH APPROACH IN THE FOREST RESERVE—*Snake River bridge.*—In the fall of 1916 the wooden approaches to the 100-foot span steel bridge over the Snake River, 2¼ miles south of the park boundary were constructed, and the bridge was put into service. The concrete piers and the steel bridge itself, together with the reinforced concrete floor, were constructed in the seasons of 1915 and 1916. Owing to the dangerous condition of the old wooden bridge over the Snake River, it was very urgent that the new bridge be placed in commission at the very earliest possible moment.

Pilgrim Creek bridge.—During the present summer work has been begun on the construction of a 300-foot span log bridge over Pilgrim Creek, about 5 miles north of Moran. The Pilgrim Creek crossing is considered the weakest point at present in the entire stretch of road from the south boundary to Moran. It has been in the past crossed by fording, but during the high waters of spring the fording of Pilgrim Creek has always been a very doubtful proceeding; and early in the present season several automobiles were stuck in attempting the crossing. The completion of the bridge will go far toward assuring access to the Jackson Lake country and to Moran, which opens up as a side trip from the park to the Teton Mountains—usually considered the most beautiful mountains in America. The work of constructing the bridge is at this time approximately 65 per cent complete.

Jackson Reservoir improvement.—During the present summer work was begun on the improvement of a stretch of road extending from about the 10½ to the 14½ mile points south of the park boundary, under a special allotment by the Reclamation Service, as the work is made necessary because of the flooding out of the original road at this section by the raising of the Jackson Lake Reservoir. In doing this work the heavy grading is done very economically by a power grader purchased in 1916, drawn by a 75-horsepower caterpillar tractor purchased the present season, which machinery is giving very good satisfaction in this work. At this time the improvement is approximately 75 per cent complete, 14,000 feet at the northern end of the improvement having now been constructed out of a total length of about 19,000 feet. This work has consisted, for the most part, of cutting down grades and eliminating sharp curves on the road which was built several years ago by the Reclamation Service to replace the drowned-out portion of the original road; but the present work has also included considerable galvanized-iron culvert installation and log-bridge construction. Log bridges and culverts were constructed as follows—three of 4-foot span, three of 8-foot span, and one of 12-foot span. In addition, on account of eliminating sharp curves, it was necessary to considerably extend two 4-foot span log culverts, one 8-foot span log culvert, and one 12-foot span log bridge. Galvanized-iron culverts have been installed on the improvement as follows—one 12-inch culvert 30 feet long, two 18-inch culverts (one 30 feet and one 36 feet long), two 24-inch culverts (one 30 feet and one 36 feet long).

General repairs.—In addition to the improvement work above noted general repairs were made to the first 10 miles of road south of the park boundary, including considerable cutting down of excessive grades about 5 and 6 miles south of the park boundary. Minor bridge repairs were also made at other points of the road between the south boundary and Moran, where especially needed.

East approach in the park—*General repairs.*—General repairs were made where necessary throughout the entire 26 miles of the east approach inside the park. Owing to the very late spring and to the heavy snows of the winter, this road was not open to traffic until July 8.

Bridges and culverts.—The bridge over Pelican Creek, which was partially refloored in 1916, was redecked with poles during the early part of the present season, as no lumber was available at the time for this work, which was very urgently needed. Extensive repairs were also made to the east approach of this bridge. Other smaller bridges and culverts received repairs, in addition to which a number of galvanized-iron culverts were newly installed; and considerable repairs were made to the approaches of the important Yellowstone River bridge.

Widening and grading.—The work of widening and improving the east road in the park to make it safe and suitable for animal-drawn and motor-propelled vehicles, under the special appropriation for this purpose, was continued as late in the fall of 1916 as weather conditions would permit. Unfortunately, the road was still closed by snow during the present season until July 8, so that the work could not be completed the present spring as was intended. The improvement has now been brought to completion on all except about 3 miles of the road (between the 9½ and the 12½ mile points east of the Lake Junction), and this portion has been partially widened and improved. The reappropriation has been requested of the balance of funds which remained unobligated at the end of the fiscal year for the widening and improving of this road.

East approach in the forest reserve—*Bridges.*—The three bridges of 100-foot span each, over the North Fork of the Shoshone River at Pahaska, 2¼ miles east of the park boundary; over the North Fork of the Shoshone River, 21½ miles east of the park boundary; and over the Elk Fork of the Shoshone River, 23 miles east of the park boundary, which were begun in 1915, were completed in the year just closed and were all put in service. These bridges were badly needed, as the old wooden bridges which they replaced were in very poor shape.

The work during the year consisted of constructing the reinforced concrete floor for the Pahaska bridge, painting the steelwork, and razing the old wooden bridge; of erecting and painting the steelwork for the North Fork bridge, 21½ miles from the park boundary, and constructing the reinforced concrete floor and approaches for the same; and of painting the steelwork and constructing the earth approaches of the Elk Fork bridge, the approaches of which will require some further improvement work in the future. There were also constructed two 30-foot span steel I-beam bridges with concrete abutments and

reinforced concrete floors, over Clearwater Creek, about 19 miles from the park boundary, and over Grinnell Creek, about 4 miles from the park boundary. In addition, the remaining wooden bridges in the forest reserve were repaired and strengthened as necessary.

Realignment.—A 1,056-foot realignment was constructed about 4¼ miles east of the park boundary, made necessary by the encroachment of the North Fork of the Shoshone River.

General repairs.—Due to the very high water existing during June, it was necessary throughout that month to maintain a small crew in the east forest reserve (at that time cut off from the park proper by deep snow on the east approach road inside the park) to patrol the road and to prevent damage, where necessary, to bridges and bridge approaches, thus enabling the traffic on this portion of the road to go on uninterrupted. Among other work this crew constructed a diversion dam necessary to protect the east approach of the new 100-foot span steel bridge over the Elk Fork, about 23 miles from the park boundary, from washout due to the high water. During the fall of 1916 there was constructed a crib revetment 330 feet long, about 13⅛ miles from the park boundary, to protect the approach named from encroachment by the river.

During the summer just closed general repairs by a flying grader crew were made throughout the length of the road in the east forest reserve, and this road was placed in excellent condition.

Cooke City Road—*General repairs.*—General repairs were made throughout the length of the northeast or Cooke City road, extending from Tower Falls Soldier Station to the northeast boundary of the park, including minor repairs to bridges and culverts where needed. More extensive repairs were made to the log bridge constructed by the Buffalo-Montana mining interests in 1915, over Pebble Creek, about 19½ miles from the Tower Falls Soldier Station. This bridge was repaired in the spring of 1916 by the same interests that built it, but during the high water of the spring just passed the center pier and the west abutment were undermined, and the necessary repairs to this bridge were made during the present summer by the Engineer Department.

Work by Robert I. McKay.—The work done by Mr. Robert I. McKay and associates, of the Buffalo-Montana Mining Co., who have mining interests at Cooke City, Mont., about 4 miles outside the northeast boundary, consisted of minor spring repairs made during the month of June. Mr. McKay and associates are interested in the upkeep and improvement of the road for the benefit of their motor trucks and trailers, for the operation of which between Cooke City and Gardiner, Mont., for the hauling of ore, Mr. McKay has a permit from the Interior Department.

FISH.

The United States Fish Commission maintains a branch fish hatchery on the shores of Yellowstone Lake in the park during the summer season. The main buildings are situated near the Lake Hotel, and the operations are of daily interest to travelers. The work consists of collecting the eggs of the black-spotted trout (Salmo Clarkii) from the native fish in Yellowstone Lake and its tributaries, developing and shipping them for planting in waters where needed. By this careful propagation many more of the eggs are saved than could be if nature were allowed to take its course, as they are protected from their natural enemies. The same variety of fish are so plentiful in a small lake near Soda Butte, in the northeast corner of the park, that it has been found profitable to gather them there also. This work has been done under the direction of Mr. W. T. Thompson, superintendent of United States hatchery at Bozeman, Mont., who informs me that the harvest was very satisfactory during the past season, especially in view of the abnormal conditions which prevailed on account of heavy winter snowfall followed by a late spring; the hot weather then coming abruptly, causing high water in the streams where the fish are taken. For some reason the small streams from Thumb to the Lake Hotel were not productive, so the streams on the east side of the lake had to carry the entire burden, except those taken at Soda Butte. Collections of eggs commenced about 10 days later than usual. The operations at Soda Butte were conducted on a small scale only, but in a few days 608,000 eggs were taken. These results seem to warrant making arrangements for work on a larger and more permanent scale next season. Mr. Thompson reports the following results of the work of his department in the park during the season of 1917:

Spawn taken during the season.

Soda Butte Lake	608,000
Clear Creek	4,455,000
Cub Creek	2,430,000
Columbine Creek	360,000
Miscellaneous sources	187,000
Total harvest	8,040,000

Fry planted season of 1917 from lake hatchery.

		Fry.	Eggs.
Aug. 16	Pelican Creek	.....	14,000
16	Bridge Creek	.....	7,000
17	Hatchery Creek	.....	3,500
18	Bridge Creek	10,000	.....
25	Pelican Creek	32,000	.....
25	Sylvan Lake	40,000	.....
26	Pelican Creek	120,000	.....
26	Bridge Bay	110,000	.....
27	Clear Creek	110,000	.....
27	Yellowstone River	90,000	.....
27	Cub Creek	100,000	.....
28	Indian Creek	100,000	.....
28	Bridge Creek	70,000	.....
29	Yellowstone Lake	100,000	.....
30	Columbine Creek	80,000	.....
30	Clear Creek (Upper)	70,000	.....
30	Clear Creek (Lower)	90,000	.....
31	Arnica Creek	100,000	.....
Sept. 3	Cub Creek	75,000	.....
5	Lewis Lake	100,000	.....
5	Lamar Creek	60,000	.....
5	Blacktail Deer Creek	35,000	.....
5	Lava Creek	35,000	.....
7	....do	15,000	.....
9	De Lacy Creek (Shoshone)	100,000	.....
9	Pelican Creek	30,000	.....
7	Yellowstone River	45,000	.....
9	Hatchery Creek	40,000	.....
9	Yellowstone Lake	16,000	.....
Aug. 10	Hatchery Creek	.....	17,500
11	Natural Bridge Creek	.....	40,000
11	Arnica Creek	.....	40,000
11	Thumb Creek	.....	80,000
	Total planted	1,773,000	202,000

In addition to the plantings of black-spotted trout the Bozeman Hatchery furnished fry of the eastern brook trout (*Salvelinus fontanalis*) for planting in park waters as follows: On July 24, 4,200 in Obsidian Creek and 4,200 in Glen Creek. On July 25, 9,000 in Glen Creek.

Through a determination to make the national parks more popular as playgrounds of the people, where amusements can be found in addition to the scenery, the question has arisen of developing the fishing in such a manner that travelers so inclined can find good fishing not too far removed from the roads. As a beginning in this direction the custom of permitting the catching in certain waters of more than the 20 fish in one day by one person, as allowed by the regulations, has been discontinued. In all matters pertaining to the development of this feature valuable assistance and advice have been rendered by the United States Fish Commission. Through the efforts of the Fish Commission officials scientific experiments were conducted in the park during the past season by Dr. Henry Baldwin Ward, head of the department of biology at the University of Illinois, and formerly the president of the American Fisheries Society, regarding the parasitic enemies of the trout in Yellowstone Lake, and the feasibility of furnishing additional food supply through the introduction of suitable minnows and other fish foods was also considered. While his report in detail has not been received, it is believed that his experiments will prove of great value and will assist later in forming a broad and comprehensive scheme for future handling of the fish in the park.

The confining of fishing to the strict letter of the regulations has not been disappointing in its results, as its effects have already been noticed in the additional interest in fishing manifested by travelers; and it has not proven as much of a disappointment to hotels and camps as was expected, for the reason that tourists have taken an unusual interest in fishing and have caught many fish that have been used on the tables.

WILD ANIMALS.

On account of the unusual severity of the past winter, which was declared by all old-timers to be the worst and longest on record, much special attention had to be given to the needs of the elk, deer, mountain sheep, and antelope. In addition to the hay raised on the alfalfa field near the northern entrance, about 112 tons were purchased for feeding these animals, making a total of about 212 tons fed during the winter, which was much more that has usually been required. The elk left the park in large numbers, seeking a lower altitude away from the deep snows, and most of the antelope insisted on remaining all winter at Electric, 2 or 3 miles north of the park line. Notwithstanding the feeding the loss was considerable, but not much if any greater than it was among the domestic animals owned by farmers in Montana. The reports as to the numbers of wild animals that died were often greatly exaggerated.

ANTELOPE.

Due to the presence of large numbers of elk that were driven down by severe weather, and to the deep snows in the park, it was found practically impossible to keep the herd of antelope inside of the park. At first it was feared that they would go on down the valley of the Yellowstone River and might never find their way back, but they seemed perfectly contented when they got beyond the point where elk were numerous and where there was not much snow, and remained during the winter and late in the spring, at Electric, Mont., 1 to 3 miles outside of the park. Through the cooperation of the State game authorities they were well cared for and fed at this point and came through the winter in as good condition as the csircumstances warranted. Most of the antelope, which winter near the northern entrance, go back into the interior of the park for the summer, but a few of them remain in the vicinity of Gardiner, where they are seen daily and present a very interesting feature to travelers.

DEER.

Mule deer are quite numerous and they, as well as the white-tailed variety, are very tame, especially in winter.

ELK.

The elk, or wapiti, are very numerous in and about the park, and, as they increase rapidly and overflow into the adjoining States, they are easily killed during the open season, and their meat affords a valuable addition to the larders of many in the vicinity. An additional asset to the adjoining States is found in the fact that hunters come long distances in the fall and spend considerable sums of money for nonresident hunting licenses, guides' wages, and for other expenses incident to hunting trips. No attempt is made to discourage legitimate hunting during the open season, but careful cooperation during the closed season between the game wardens representing the States and the park and Forest Service officials representing the Federal Government has resulted during the past year in reducing the poaching to a minimum. Practically all of that part of the northern herd of elk known as the Gallatin herd wintered outside of the park last winter, on the west Gallatin River and tributaries. Several thousand of the main part of the northern herd were also driven out of the park by deep snows and wintered in the mountains down the Yellowstone Valley from Gardiner. Ordinarily, most of these would return to the park in summer, but the spring was so backward that the calves began to appear before they left the lower country, and I have been told that many of them summered outside of the park.

Like domestic stock and other game, the elk suffered during the long and severe winter, and the loss was quite heavy. Such relief was afforded as was practicable, but the amount of hay procurable was wholly inadequate to the actual needs.

Under authority of the National Park Service, shipments of live elk were made during the winter of 1916–17, as follows:

California (San Francisco)	2
Canada	63
Colorado (allotted to Department of Agriculture)	50
Idaho	50
Missouri (allotted from Wyoming)	40
Montana	6
North Carolina (allotted to Department of Agriculture)	25
North Dakota (allotted to Department of Agriculture)	15
South Dakota	50
Virginia	151
Washington, D. C	4
Wisconsin	40
Total	496

The following memorandum shows the total number of elk shipped from the park since the fall of 1911:

Destination of shipment.	1911–12	1912–13	1913–14	1914–15	1915–16	1916–17	Total.
Alabama					50		50
Arizona		80					80
California		50				2	52
Canada [1]						63	63
Colorado		25	31	50	50		156
Georgia					2		2
Idaho				50	50	50	150
Louisiana					40		40
Massachusetts		4					4
Michigan				25			25
Minnesota				32	2		34
Missouri				3		[2] 40	43
Montana	31		30	50	50	6	167
New Mexico				50			50
New York				8	50		58
North Dakota			2		4		6
Ohio			3				3
Oregon			6				6
Pennsylvania		50			100		150
South Carolina				2			2
South Dakota		3	2	50		50	105
Texas					20		20
Utah		25		25	50		100
Virginia		25				151	176
Washington	106	201	25		50		382
Washington, D. C						4	4
West Virginia		50					50
Wisconsin				30		40	70
Wyoming		25					25
Total	137	538	99	375	518	406	2,073
Department of Agriculture:							
Colorado					50	50	100
Montana					25		25
North Carolina						25	25
North Dakota						15	15
South Dakota					25		25
Grand total	137	538	99	375	618	496	2,263

[1] Shipped to Rocky Mountain Park, Banff, Canada. [2] Allotted from Wyoming.

ELK CENSUS.

Arrangements were made early in March to make a complete census of the northern herd of elk, the work to be done jointly by the National Park Service and the Forest Service of the Department of Agriculture. Due to the extreme depth of the snow and the lateness of the spring, this work had to be

postponed from time to time until it was finally May 22 before the actual work of counting the main part of the herd was begun. That part of the herd ranging on Madison River was counted March 19 to April 10, and those on the Gallatin River, northwest of the park, April 11 to 22—all on snowshoes. The work was finished on June 9. It was agreed by those participating in the counts that the results were as accurate as could be procured under the conditions that governed, and the count was accepted as official. The figures as reported showed as follows:

Herd.	Live elk.	Dead elk.	Killed by hunters.	Shipped by Federal Government.	Shipped by State.	Total.
Gardiner	17,422	3,069	100	496	68	21,155
Gallatin	1,670	256	400	.....	.....	2,326
Madison	253	4	7	.....	.....	264
Total	19,345	3,329	507	496	68	23,745

Reports received during the summer indicate that the elk that survived the hard winter are all in excellent condition, and that there is at least an average number of young calves in the herds.

Plans should be made for the handling of the large herds of elk in and about the park to the best possible advantage, so that reasonable benefits may be derived from them by shipping them alive to restock old ranges, and permitting a reasonable amount of hunting in the country adjoining the park. Such plans should contemplate raising a sufficient amount of hay to be used only in hard winters, to insure the herds against severe losses. There are several places in the park, mostly in the northern part, where the elk naturally spend the winter, where hay can be raised to a good advantage and at a minimum cost. The small field now in alfalfa, located near Gardiner, Mont., does not always furnish sufficient hay for the antelope, deer, and mountain sheep, which are much less numerous than are the elk.

MOOSE.

Moose are frequently seen in the park in small numbers. They are protected by the game laws of the adjoining States and are apparently thriving.

BUFFALO.

Wild herd.—Sixty-seven wild buffalo were counted in May, in the Pelican Valley, of which seven were calves. One dead bull—a large one that had been snowed under; one dead calf, evidently killed by coyotes or wolves, and one dead calf that had evidently been drowned while crossing a stream were also found.

Tame herd.—The tame herd now consists of 330 animals, namely, 139 males and 131 females, of ages from 1 to 21 years, and 60 calves born during the past summer, sex undetermined.

The number on hand October 1, 1916, was 146 males and 130 females, total 276. Three calves were born during the fall of 1916, after October 1.

During the year nine have been disposed of as follows: One 5-year-old cow died in December, from no apparent cause, except weakness. One bull was drowned, and a yearling bull was found dead in July. One 2-year-old bull and two 3-year-old bulls were found dead in August, probably gored to death by older bulls. One 3-year-old bull and two 4-year-old bulls were shipped to the State of Wyoming on September 26.

Specimens are furnished to the National Museum from those that die, when it is practicable to do so, but in many cases the carcasses are not found before they are spoiled by decay or so badly torn by coyotes as to be worthless.

It is of the utmost importance that some provision be made to dispose of the surplus bulls in this herd. They have become so numerous and there are so many of them that are old and vicious that they are unmanageable, often dangerous to life, and the unnecessary number of bulls is a great detriment to the herd from every standpoint. A few are disposed of annually by donat-

ing them to city parks, zoos, etc., but the expense of crating and shipping them has to be borne by the recipients, and as this is considerable we have not been successful in giving many away. Fifteen are usually brought in to Mammoth Hot Springs from the main herd on Lamar River for a summer show herd. Attempts have been made to drive them back to the range of the wild herd, but they have been fed and ranged so long on the Lamar River and vicinity that they return to that range as fast as they can be driven away. The raising of bison has been so successful among the various herds now maintained in the United States and Canada that they are no longer hard to obtain, and I am of the opinion that the solution of the problem of disposing of the surplus males will eventually be to market them for meat.

Over 200 tons of hay have been harvested for feeding the buffalo during the coming winter. This is not sufficient and will have to be very carefully handled to make it do. It was necessary to begin feeding hay on January 2 last winter. Over a hundred acres of fine meadow land, about 3 miles south from the present buffalo farm, on Lamar River, have been plowed and are now being prepared for seeding to winter rye to be cut next summer to supplement the hay crop, and more of this work will be done if funds available will permit The land that is being plowed will eventually be seeded to grass, to be cut for hay.

BEARS.

Black and cinnamon bears (Ursus americanus Pallas) are quite numerous in the park. Grizzly or silvertip bears (Ursus horribilis Ord) are common, but not so plentiful as are the blacks. Both are seen daily by tourists and afford them a great amount of pleasure. The black bears hang around the hotels and camps almost constantly, where they are often fed from the hand by people who do not realize that they are taking desperate chances of being injured by playing with fierce wild animals at close quarters. Efforts are made to prevent such feeding, but they are successful only when the full cooperation is had from the hotel or camp help, which is not always the case. In many cases the help, and sometimes even the guards, participate in feeding and playing with the bears. Almost invariably bears so treated eventually become dangerous and have to be killed. Sixteen have been killed during the past season. Several requests for bears to be captured and shipped to zoos are on file, and have been approved by the Service, but thus far it has been impracticable to procure the services of anyone to capture them, as labor is very scarce.

COYOTES AND WOLVES.

During the past winter two rangers devoted the most of their time to hunting and trapping coyotes and wolves, and they, with others who killed them occasionally when opportunity offered in connection with their other work, succeeded in destroying about 100 coyotes and 4 wolves. It is necessary to keep this work up year after year, as it is not practicable to kill all of them, and they increase rapidly and are a constant menace to the other wild game.

MOUNTAIN LIONS.

Mountain lions are known to exist in considerable numbers in the park and to be quite destructive to other game animals, but they are seldom seen, as they are wary in their habits, and can not be hunted successfully except with trained dogs.

MOUNTAIN SHEEP.

The mountain sheep did not seem to be so much affected by the severe winter as did most of the other animals. The little band that winters in Gardiner Canyon was found to be afflicted with a form of scab, very similar, if not identical, with the ordinary kind found on domestic sheep. This particular band of mountain sheep has doubtless been afflicted with scab for many years, and it probably results in the death of a few of them. Experiments to determine its character and possible cure were made last winter, as described in another section of this report.

Many other kinds of wild animals, such as beavers, porcupines, rabbits, lynx, bobcats, foxes, otter, martin, mink, weasels, gophers, conies, skunks, badgers, squirrels, chipmunks, woodchucks, muskrats, etc., are found in the park.

Beavers are quite numerous in many streams, and their work, which is seen close to the road in many places, is of great interest to tourists. Five beavers were captured and shipped to the city of San Antonio, Tex., on April 14, and two more were shipped to the same place on May 8 to take the place of two that died. Five were captured and shipped to the State of South Dakota on June 7.

DISEASES OF ANIMALS.

During the early part of the summer, a veterinarian of the Department of Agriculture, Bureau of Animal Industry, from the office in Bismarck, N. Dak., was present in the park and made experiments relative to diseases of wild animals, particularly of the mountain sheep in Gardiner River Valley, which were found to be infested with common sheep scab. The mountain sheep captured for his experiments all died of hemorrhagic septicemia, which has appeared occasionally among the wild animals of the park. He also tested all horses in use in the park for glanders. No disease was found to exist in the large herds of elk.

BIRDS.

To lovers of nature the bird life in the park is one of its most interesting features. One hundred and ninety-four varieties of birds have been noted, and while most of them are summer residents only and migrate in the fall, there are quite a number that remain in the park the year around.

PROTECTION OF GAME.

With many miles of the park lines protected by game preserves of the adjoining States, and with splendid cooperation on the part of the game wardens and Forest Service officials, the opportunities for poaching were reduced to a minimum. But one arrest was made for poaching, this being in the case of two men who, through ignorance of the country, followed a deer trail into the park and were arrested before they had overtaken the deer. They paid their fines and said they were very glad they had been arrested before they had shot at anything. The antelope and elk that strayed outside of the park on account of the severe winter weather were protected until late in the spring by park rangers, forest rangers, and State employees, and poaching among them was not common. Supplies were placed out at 19 snowshoe cabins and stations that were not regularly garrisoned and used by rangers making snowshoe trips during the winter in connection with the protection of game.

VIOLATIONS OF LAW.

Violations of law have not been common. During the past summer in a few instances formations have been marred by scratching names, etc., on them, and in many cases camp fires have not been extinguished, but with motor transportation, which is used by the large majority of tourists, it is difficult to apprehend the offenders, as they break camp and get away many miles before the offense is discovered. Many small camp fires have been extinguished by patrols and park employees after the camping parties have left them. If offenders of this sort are to be captured, a few motorcycles are essential for road patrols.

SANITATION.

Frequent inspection of hotels and permanent camps were made throughout the tourist season, and twice during the season they were visited by an inspector of the department who is an expert on the question of handling food supplies. In addition to his inspections, he was able to make suggestions to the permanent camping company in regard to the arrangement and sanitation of the kitchens in connection with the new permanent camps, which were of much value, both from the point of cleanliness and the convenience in handling foods.

The meats used in the park were inspected before and after slaughter by an expert furnished for the purpose by the Department of Agriculture. The fresh meat used in the park was slaughtered outside and brought in on motor trucks, instead of being slaughtered inside, as has heretofore been the custom; and the cattle and sheep used for this purpose were not grazed in the park.

The four special sanitary camps constructed last year for convenience of parties traveling in their private automobiles and desiring to camp out were maintained during the season, and were well patronized. A supply of firewood was kept convenient to each of them, the grounds were policed, and the earth closets here and at other points were cared for. For this work a light motor truck was purchased, to replace the team and wagon heretofore hired for the purpose. The work can be done much more efficiently with the truck, as the camps can be visited more frequently, with but little, if any, greater expense.

FOREST FIRES.

While many camp fires were abandoned without having been extinguished, they were usually located close to the road, where they were discovered and extinguished by patrols or park employees before they had time to get into the forest. On July 31 a small forest fire broke out close to the main road 12 miles inside of the park from the western entrance. First reports indicated that it could not be controlled by the members of the detachment stationed at Riverside Station, 8 miles away, and the commanding officer detailed 40 troopers from Fort Yellowstone, commanded by a commissioned officer, to fight it. The Yellowstone Park Transportation Co. voluntarily turned out four of their 10-passenger automobiles to take the men to the scene of the fire, and they reported at Fort Yellowstone 10 minutes after they had been notified of the urgent needs. But the fire proved not so bad as first reported, and by the time the troopers reached it those from Riverside Station had it under control. Ten men were left at the scene over night, to make sure that the fire did not break out again. Investigation of the cause indicated beyond a doubt that it had broken out from a camp fire of a tourist, and it was evident that when he found he could not control it, instead of giving the alarm and asking for assistance he had fled precipitately, leaving part of his camp equipment on the ground. Efforts to locate the guilty party were unsuccessful.

A small fire was discovered on the north end of Mount Everts on August 7, but was extinguished without difficulty by a small detachment of soldiers from Fort Yellowstone. It was probably set by lightning.

On August 10 it was reported that a large fire was burning on Nez Perce Creek, about 2½ miles above Fountain Soldier Station. The detachment on duty at Fountain Station, assisted by members of a small road crew in the vicinity, did good work holding it until the arrival of a large detachment of troopers commanded by several commissioned officers, sent from Fort Yellowstone and from such stations where they could be spared. In this case the transportation company turned out seven 10-passenger automobiles to take the troops to the fire and bring them back. It was reported out on August 11, and the troops were withdrawn. The area burned over by this fire consisted of a strip about half a mile long and 600 feet wide in the widest part—total area burned, 16 to 18 acres. It was in jack pines, too far from the road to be noticed, and the damage was immaterial. The chief scout, whom I sent out on August 14 to make a report on this fire, found it still burning in places, and so reported to the noncommissioned officer in charge of Fountain Station, who immediately sent members of his detachment to thoroughly extinguish it and watch it until danger of its breaking out again should be past. The cause of this fire is not known, but it followed quite a severe local thunderstorm, and it is my opinion that it was set by lightning.

On the same date another smaller fire was reported about 2 miles west from Madison Junction, across Madison River from the west entrance road. This was extinguished by a small detachment of soldiers from Riverside Station and a small road crew which happened to be working in that vicinity.

The season was very dry, and it was fortunate that no more serious forest fires occurred. In the two or three instances where they threatened to spread to large proportions, the quick action by the few station men in the vicinity, assisted by members of the road camps, and the assistance of the transportation company in getting the troops to the scene without delay, was probably responsible for preventing serious and extensive forest fires.

IMPROVEMENTS.

Two crews of men have been employed during the entire working season in rebuilding the telephone lines in the park. It was the intention to reconstruct the whole system, but labor is so scarce that linemen could not be procured

to handle more work than could be accomplished by two crews. To October 1 they have succeeded in rebuilding 17 miles of the lines from Lake to east entrance; 17½ miles from Thumb to south entrance; 2 miles from headquarters to Norris. Lines have been repaired as follows: Nine miles from Lake to east entrance; 4 miles Thumb to south entrance; 6 miles headquarters to Norris. These crews are still at work, and will be continued as late this fall as weather will permit. It is contemplated getting the greater portion of the telephone lines rebuilt this fall, or next spring before the opening of the tourist season, and constructing new line to connect Crevice Station with headquarters.

Fire lanes have been constructed and repaired since July 1, as follows:

Riverside-Willow Park fire lane from Willow Park to Riverside, 26 miles, cleared out and repaired.

Summit Lake fire lane from west boundary to Biscuit Basin, 16 miles, cleared out and repaired.

West boundary fire lane from Yellowstone, Mont., south to junction with Summit Lake fire lane, 18 miles, cleared out and repaired.

Lake of the Woods fire lane from Beaver Lake to Norris, 8 miles, an old road cleared out and rebuilt as a fire lane.

Grebe Lake fire lane opened up and built new from Virginia Meadows to Chittenden road, near Canyon Hotel, 12 miles.

East Yellowstone fire lane, built new from Chittenden Bridge at Canyon, south to Yellowstone Lake outlet, 14 miles.

Mesa fire lane from Gibbon Canyon to Loop road near Lower Geyser Basin, an old road, cleared out and rebuilt as a fire lane, 8 miles.

Fairy Falls fire lane, from Fountain Soldier Station to Fairy Falls, relocated and rebuilt, 6 miles.

Sepulcher Mountain fire lane, built new from Mammoth to top of Sepulcher Mountain and return to Sportsman Lake fire lane, 7 miles.

Fire lane to river's edge below Lower Falls of the Yellowstone, relocated and rebuilt, one-half mile.

Shoshone Lake fire lane, from Lone Star Geyser to Shoshone Geyser Basin and on to Sheridan fire lane at outlet of Shoshone Lake, repaired, shortened, and rebuilt, 20 miles.

Sheridan fire lane, from loop road at DeLacy Creek to Lewis Lake, rebuilt, 14 miles.

Blacktail Range fire lane, from Grebe Lake fire lane at Cascade Lake to Petrified Trees, via the Blacktail Deer range, built new 21 miles.

Lamar-Mary Bay fire lane, from Mary Bay, Yellowstone Lake, to mouth of Soda Butte Creek, repaired and relocated, 48 miles.

Amethyst Mountain fire lane, from mouth of Soda Butte Creek to top of Amethyst Mountain, built new, 6 miles.

Little Firehole fire lane, from end of Fairy Falls fire lane to Biscuit Basin via Little Firehole River and Mystic Falls, built new, 11 miles.

Fire lane along east rim of the canyon from Chittenden Bridge to Artists Point, built new, 2 miles.

Fire lane from loop road to brink of Lower Falls of the Yellowstone River, repaired, 1 mile.

Old Canyon fire lane, repaired for 10 miles from Glacier Boulder at Canyon toward Tower Falls.

Lake Shore fire lane, from loop road 5 miles north of West Thumb to Bridge Bay, an old road cleared out and rebuilt as a fire lane, 11 miles.

Sportsman Lake fire lane from Snow Pass to Gallatin Soldier Station, cleared out and repaired, 19 miles.

Fawn Pass fire lane, from Snow Pass to Gallatin Soldier Station, via Fawn Pass, cleared out and repaired, 24 miles.

Fire lane, from brink of canyon to edge Yellowstone River, between the Upper and Lower Falls of the Yellowstone, one-half mile, new.

Old wagon road, from Canyon Hotel southwest to loop road to Norris, 3 miles west of Canyon Junction, rebuilt as a fire lane, 3 miles.

Fire lane connecting Little Firehole fire lane at Little Firehole Meadows to Summit Lake fire lane 2 miles northeast of summit Lake, built new, 4 miles.

Mallard Lake fire lane, from loop road 1 mile south of Upper Geyser Basin to Mallard Lake and return to loop road 4 miles south of Upper Geyser Basin, built new, 8 miles.

Seven-Mile Hole fire lane from Old Canyon fire lane to edge of Yellowstone River, 3 miles, repaired and rebuilt.

Specimen Ridge fire lane, from top of Amethyst Mountain to Cooke City road near Junction Butte, built new, 12 miles.

Obsidian Creek fire lane, from Riverside-Willow Park fire lane to loop road at Crystal Spring, built new, 2 miles.

In construction of these fire lanes they have been located, when practicable, in such a manner that they may be utilized, in part at least as a portion of a complete system of trails to be built later through the park. A special study of such a trail system has been made for future consideration.

More than a hundred acres of land have been plowed and is now being harrowed and seeded to winter rye to be cut next summer for hay for the tame buffalo on Lamar River near Specimen Ridge. This land has never been plowed before, and will require considerable work, and probably one more plowing next year before it will be smooth enough for a good meadow. Ditches must also be built to irrigate it. It is contemplated plowing another hundred acres for raising hay for game, and constructing the ditches for irrigating, before next season.

NATURAL PHENOMENA.

Many changes have been noted during the past year in the terraces at Mammoth Hot Springs, and due to these changes which are very noticeable, many believe that they are gradually disappearing. But this can only be determined by making a careful study of them as a whole, and not on the condition of any one terrace, as it is well known that when one of them appears to partially die out, others are frequently more active. Early in the present year, the two big springs appeared to be much less active than usual, but careful examination disclosed the fact that there were two slight cracks across the bowl of the most southerly one, and one across the other, and as an unusual quantity of water was coming from some small hot springs several hundred feet below the foot of the terrace, it was only logical to suppose that much of the water from the big springs that usually overflows in all directions, was leaking through the bottom and finding other channels of outlet, through the formations. Within a few weeks the condition was improved, and at the present time it appears that the usual amount of water is coming from these two springs, although it is flowing out mostly in one direction—toward Pulpit Terraces—leaving the greater part of the big terraces close to the main road dry and lacking in their usual beauty. Angel Terrace is more active and beautiful than ever known before.

Many changes are noted in Norris Basin, but they are of such frequent occurrence as hardly to be necessary of record. A small geyser broke out in the green timber about 200 hundred feet from the road, opposite to the Black Growler, last spring. At first it played frequently, 30 to 50 feet high, but has recently played only at irregular intervals, and eventually will probably stop entirely, as has usually been the case with the geysers that break out frequently in that basin.

ACCIDENTS.

No serious accidents occurred in connection with the handling of tourist traffic in the park during the season. With so large a number of travelers who are strangers to the park and to mountain driving it would have been marvelous if there had not been some careless driving. A few narrow escapes were recorded, and doubtless many more happened that were not recorded, but none of them resulted seriously.

On August 7, Mr. John W. Havekost, of Coleridge, Nebr., while standing near the edge of the Yellowstone River in the Grand Canyon below the Lower Falls, was struck on the head by a small piece of falling rock from a slide from the canyon walls, and so severely injured that he died at the hospital at Fort Yellowstone on the following day. The accident was unavoidable, and due to the fault of no one. Many people climb down into the canyon where he was injured during the summer, although they know that there is some danger in so doing and danger signs are posted.

RECOMMENDATIONS.

The administration, protection, and improvement of Yellowstone National Park should all be under one head. Since provisions have been made by Congress for a National Park Service to administer all of the national parks as

a whole, it seems inconsistent that affairs should be so arranged that the local control should be vested in three heads. Unquestionably, a combination of the three under one head would result in greater economy and efficiency.

The introduction or sale of intoxicating liquor and gambling in the park should be prohibited. With the present tendency of the Government to conserve the energies and resources of the country, it seems only reasonable to encourage thrift and economy by preventing, if possible, the wasting of money on things that are unnecessary, objectionable to many, very often detrimental, and not permitted at all in many of our States.

YOSEMITE NATIONAL PARK.

W. B. Lewis, Supervisor, Yosemite, Cal.

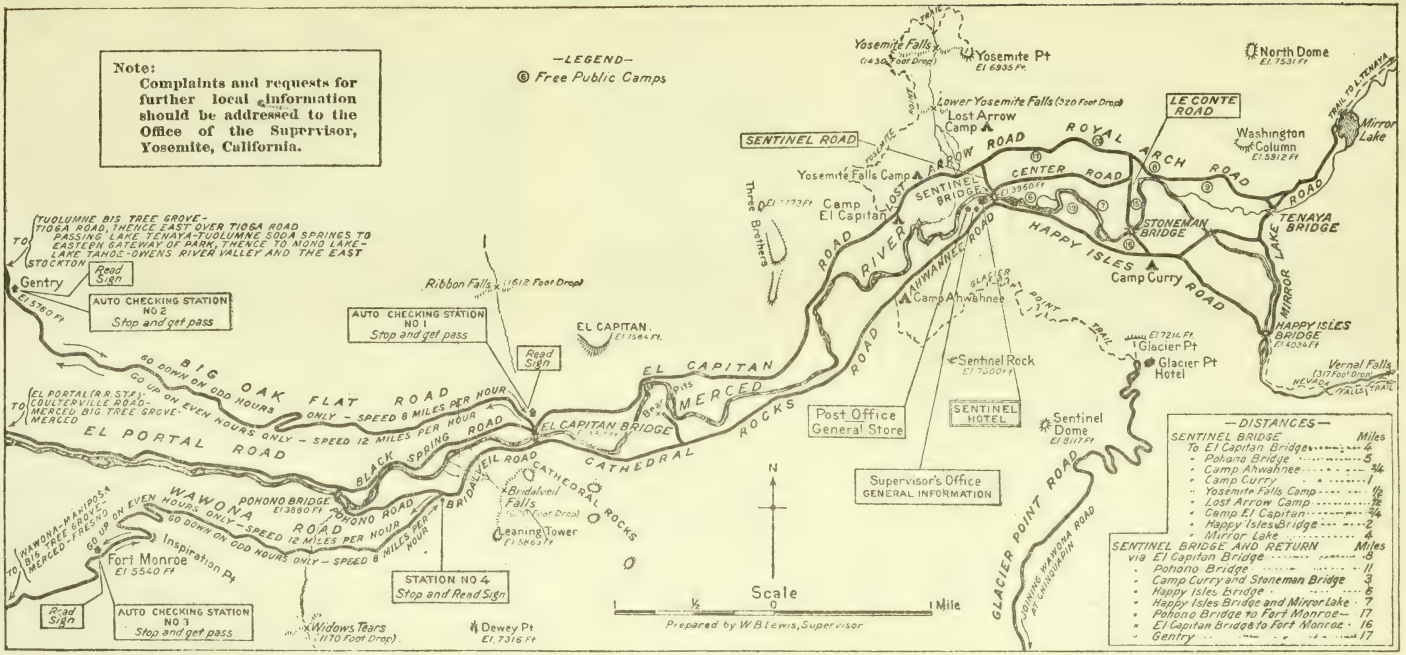
GENERAL STATEMENT.

The Yosemite National Park, when created by the act of October 1, 1890 (26 Stat., 650), was situated in Tuolumne, Mariposa, Madera, and Mono Counties, Cal., and covered an area of about 1,512 square miles, being 36 miles wide by about 40 miles long. Under the act approved February 7, 1905, entitled "An act to exclude from the Yosemite National Park, Cal., certain lands therein described and to attach and include the said lands in the Sierra Forest Reserve," 542.88 square miles were excluded and 113.62 square miles were added to the park, making a net reduction in area of 429.26 square miles, so that the area, after the passage of the above act, was 1,082.74 square miles, the park being situated in Tuolumne, Mariposa, and Madera Counties. By act of June 11, 1906, entitled "Joint resolution accepting the recession by the State of California of the Yosemite Valley grant and the Mariposa Big Tree Grove, and including the same, together with fractional sections 5 and 6, township 5 south, range 22 east, Mount Diablo meridian, California, within the metes and bounds of the Yosemite National Park, and changing the boundaries thereof," there were added to the park the Yosemite Valley, 48.60 square miles; Mariposa Big Tree Grove, 4 square miles; and a strip lying between the latter and the park proper, 2.13 square miles; and deducted by the change in the southwestern boundary, 13.06 square miles; making a net addition to the area of 41.67 square miles. The present area of the park is 1,124.41 square miles.

ROADS.

During the fiscal year 1917 the service maintained approximately 104 miles of road as follows: Floor of Yosemite Valley, 22 miles; El Portal road, 8 miles; Big Oak Flat road, 13 miles; Wawona road, 4 miles; roads in Mariposa Grove of Big Trees, 10 miles; and Tioga road, 47 miles. As indicated in former reports, all of these roads, with the exception of a few miles on the floor of Yosemite Valley, are dirt roads which were originally built as wagon roads and which have been gradually improved until reasonably safe for automobile travel. All of these roads, however, are built on heavy grades and with sharp, dangerous curves, and the roadbeds themselves vary from 10 to 15 feet in width. The result is that automobiles, especially those of lighter construction, travel these roads only with considerable difficulty and with a considerable element of danger. That these conditions exist is unfortunate and every effort should be made to take up the work of their improvement in order that automobilists may travel these roads with safety and with greater degree of ease and comfort. Grades should be reduced wherever possible to a maximum of 6 to 8 per cent. Sharp curves should be eliminated and the roadbeds widened to not less than 16 feet. In addition, and in order to decrease the heavy expense of opening and repairing the roads in the spring, they should be thoroughly ditched and drained and sufficient culverts installed to prevent washouts.

The roads on the floor of the valley between the village and Pohono bridge have been widened and grades reduced where necessary, and an additional 4 miles have been graveled to a width of 16 feet. This brings the total amount of roads on the floor of the valley that are now in fairly good condition, surfaced with either gravel or macadam, to about 9 miles. There still remain some 13 miles of road to be improved. Funds have been made available for this work and it will be completed during the coming year.


Note:
Complaints and requests for further local information should be addressed to the Office of the Supervisor, Yosemite, California.
—LEGEND—
Free Public Camps
Yosemite Falls (1430 Foot Drop)
Yosemite Pt El 6935 Ft.
North Dome El. 7531 Ft.
Lower Yosemite Falls (320 Foot Drop)
Lost Arrow Camp
LE CONTE ROAD
TRAIL TO TENAYA
Mirror Lake
Washington Column El. 5912 Ft.
SENTINEL ROAD
POST OFFICE
Yosemite Falls Camp
LOST ARROW ROAD
ROYAL ARCH ROAD
CENTER ROAD
SENTINEL BRIDGE
El 3960 Ft
Three Brothers
El 1773 Ft
Camp El Capitan
RIVER ROAD
STONEMAN BRIDGE
TENAYA BRIDGE
HAPPY ISLES ROAD
Camp Curry
MIRROR LAKE ROAD
TUOLUMNE BIG TREE GROVE-TIOGA ROAD, THENCE EAST OVER TIOGA ROAD PASSING LAKE TENAYA-TUOLUMNE SODA SPRINGS TO EASTERN GATEWAY OF PARK, THENCE TO MONO LAKE-LAKE TAHOE-OWENS RIVER VALLEY AND THE EAST
TO STOCKTON
Gentry
Road Sign
El 3760 Ft
AUTO CHECKING STATION NO 2
Stop and get pass
Ribbon Falls (1612 Foot Drop)
AUTO CHECKING STATION NO 1
Stop and get pass
EL CAPITAN
El 7564 Ft.
Road Sign
Camp Ahwahnee
AHWAHNEE ROAD
GLACIER POINT TRAIL
El 7214 Ft.
Glacier Pt
Glacier Pt Hotel
HAPPY ISLES BRIDGE
El 4036 Ft
Vernal Falls (317 Foot Drop)
NEVADA FALLS TRAIL
Sentinel Rock
El 7000 Ft
EL CAPITAN ROAD
MERCED ROCKS
CATHEDRAL ROCKS
Post Office General Store
SENTINEL HOTEL
Sentinel Dome
El 8117 Ft
TO EL PORTAL (M.P. STA.) COULTERVILLE ROAD-MERCED BIG TREE GROVE-MERCED
BIG OAK FLAT ROAD
GO DOWN ON ODD HOURS
GO UP ON EVEN HOURS ONLY — SPEED 8 MILES PER HOUR
EL PORTAL ROAD
BLACK SPRING ROAD
EL CAPITAN BRIDGE
El 3593 Ft
BRIDALVEIL ROAD
CATHEDRAL ROCKS
Bridalveil Falls (620 Foot Drop)
Leaning Tower El 5863 Ft
Supervisor's Office GENERAL INFORMATION
N
Scale
½ 0 1 Mile
Prepared by W.B. Lewis, Supervisor
GLACIER POINT ROAD
JOINING WAWONA ROAD AT CHINQUAPIN
WAWONA ROAD
POHONO BRIDGE
El 3880 Ft
POHONO ROAD
GO DOWN ON ODD HOURS ONLY — SPEED 12 MILES PER HOUR
GO UP ON EVEN HOURS ONLY — SPEED 12 MILES PER HOUR
TO WAWONA-MARIPOSA BIG TREE GROVE-MERCED-FRESNO
Inspiration Pt
Fort Monroe El 5540 Ft
Road Sign
AUTO CHECKING STATION NO 3
Stop and get pass
STATION NO 4
Stop and Read Sign
Widows Tears (1170 Foot Drop)
Dewey Pt El 7316 Ft
—DISTANCES—
SENTINEL BRIDGE — Miles
To El Capitan Bridge ... 4
" Pohono Bridge ... 5
" Camp Ahwahnee ... 3/4
" Camp Curry ... 1
" Yosemite Falls Camp ... 1/2
" Lost Arrow Camp ... 1/2
" Camp El Capitan ... 3/4
" Happy Isles Bridge ... 2
" Mirror Lake ... 4
SENTINEL BRIDGE AND RETURN via El Capitan Bridge — Miles ... 8
" Pohono Bridge ... 11
" Camp Curry and Stoneman Bridge ... 3
" Happy Isles Bridge ... 6
" Happy Isles Bridge and Mirror Lake ... 7
" Pohono Bridge to Fort Monroe ... 17
" El Capitan Bridge to Fort Monroe ... 16
" Gentry ... 17

AUTOMOBILE GUIDE MAP SHOWING ROADS IN THE YOSEMITE VALLEY, YOSEMITE NATIONAL PARK.

It is also proposed during the coming autumn to experiment with oil on a small portion of these roads. If the experiment proves satisfactory it will be recommended that this method of treatment be extended to all of the roads on the floor of the valley, thereby eliminating the expensive and present unsatisfactory method of sprinkling with water.

In September, 1916, under specific appropriation by Congress, work was begun on the reconstruction of the El Portal road, between Pohono bridge and the western park line, a distance of 8 miles. The grading of approximately 1 mile of this road was completed during the year. When completed the road will have not more than 20 feet clear driveway, surfaced with oil-bound macadam and will have grades not exceeding 6.4 per cent. Too much importance can not be attached to the necessity for the completion of this work, as at present the traffic on this road in passengers and freight probably exceeds that on all the other roads of the park combined. That this traffic will increase manyfold with the completion of the State highway from Mariposa to El Portal and the park boundary is unquestionable, as the completion of that link connecting the State highway of the San Joaquin Valley directly with the park by a surfaced highway of low grades and low altitude and passable at all seasons of the year, will place Yosemite Valley within four hours by automobile from Merced. Thousands of automobilists who at this time fear to attempt the steep grades of the other roads entering the park are certain to take advantage of the opportunity offered by the new highway for frequent visits to the park. An appropriation of $75,000 became available on July 1, 1917, for the continuation of this work. This will complete another 5 miles of the grading, and it is considered very essential that funds be made available for its further continuation and final completion.

TRAILS.

Of approximately 650 miles of trails within the park but little work has been done during the past year on any of those lying without the Yosemite Valley. The so-called ledge trails extending from the floor of the valley to and around its rim and of which there are some 37 miles get, of course, the large bulk of the travel during the tourist season. As it is essential that these trails be kept in good condition practically all of the funds that have heretofore been available for improvement and maintenance of trails have been applied to these. It is urged that consideration be given to the improvement of the trunk-line trails lying without the Yosemite Valley not only for the convenience of the relatively small travel over them into the back country, but also in order that there may be an incentive for a decided increase in travel to these regions.

It is a well-known fact that for the best interest of the park as a whole disproportionate publicity has been given to the waterfalls and other features of Yosemite Valley with the result that travel to other portions of the park has been minimized. Although it is realized that Yosemite Valley itself will always be the most important feature of the park, both because of its accessibility and because of its many features of attraction for the recreationist, and as it is also realized that the bulk of moneys expended in development work in the park should be expended in and around Yosemite Valley where it will be of the most good to the most people, it is, however, important that a certain amount of development work be done in the outlying portions in order to attract visitors and thereby make known to the public something more of the opportunities for campers and outdoor people in those areas.

During the past year a trail was built from the White Cascades down the Tuolumne River to a point near the top of the first Water Wheel Fall. This has resulted in a large increase in the number of visitors to the Water Wheel Falls during the past year. In order, however, to completely accomplish the object for which this trail was started, namely, that of reaching all of the Water Wheel Falls, it is necessary that the trail be continued some 2 miles down the canyon to Return Creek, a tributary of the Tuolumne River. With this trail completed the Water Wheel Falls country would be easily accessible by horseback and the trail would be extended to a point from where at some future time, should travel warrant it, it could be extended down the entire Tuolumne Canyon to Hetch Hetchy. This latter proposition is not one for consideration at this time, but should be given consideration in connection with plans for the future development of the trail system.

On July 1, 1917, funds were made available for the construction of a new trail, some 8 miles in length, between the McClure Fork of the Merced River and Tuolumne Pass, by way of Babcock and Emeric Lakes. The completion of this trail will shorten the distance between Merced Lake and the Tuolumne Soda Springs by some 3 or 4 miles and will eliminate that portion of the present trail which passes over Vogelsang Pass and which, because of its high elevation, is late to open, dangerous, and extremely hard to maintain in a passable condition.

BRIDGES.

As was noted in my report of last year, the question of bridges on the floor of Yosemite Valley is an important one. I stated at that time that there was but one bridge that had a safe loading capacity of more than 6 tons. Aside from the Sentinel, El Capitan, and Pohono bridges, all the bridges are wooden structures, varying from 60 to 80 feet in span, built of native hewn timbers. All of these wooden bridges have been in use from five to eight years and will unquestionably have to be replaced within the next year or two. In fact, during the past winter one of these bridges, the Clark bridge, collapsed, and it was necessary to practically rebuild the entire structure. All of these bridges, being of short span, could be constructed of reinforced concrete at comparatively low cost and would be practically permanent structures. This matter should be given serious consideration and all possible efforts should be made to secure funds within the near future for their construction.

Of course the most important of all the bridge structures and the one that it is becoming more and more essential to have replaced is the Sentinel bridge, near the Sentinel Hotel. More traffic by far passes over this bridge than any other, and its frail steel construction, now condemned for several years, is such that its failure may be looked for at any time. An appropriation of $8,000 was made by Congress, available July 1, 1917, for the construction of a bridge to replace this structure. Its span of 105 feet and the necessity for constructing it with a roadway of not less than 20 feet in width, together with footways of not less than 4 feet on either side, make it apparent that the amount of money appropriated is wholly inadequate for any kind of a structure of the required dimensions. It has, therefore, been found necessary to give up the idea of constructing it until such time as sufficient funds may be made available for the construction of a suitable and satisfactory structure.

BUILDINGS.

Most of the buildings used by the service for housing its employees as well as for office quarters are buildings originally constructed by the War Department at a time when Yosemite Valley was a summer institution only. From time to time these buildings have been improved and repaired until at present all are in a comfortably habitable condition. The last of the cottages used by the employees was ceiled during the past year.

However, from the increased travel to the park and the additional development work that is going on, there has resulted, of course, a need for additional quarters. How these are to be supplied is a question for consideration, but it would appear most logical to construct them from material already owned by the Government and now in use by concessioners in their operations.

During the year for which this report is submitted, shops and barns were constructed, giving the park first-class facilities for the housing of stock and equipment and room for the carrying on of carpentry, plumbing, electrical, blacksmith work, etc. There remains to be constructed but one building for use as a machine shop, which should be gradually equipped as necessity arises and funds become available.

ELECTRICAL SYSTEM.

The power plant was operated 24 hours daily throughout the year with the exception of a 32-hour shutdown on February 24 and 25, 1917. This shutdown was made necessary by severe storms which almost completely wrecked the high-tension transmission lines. Up to their capacity, the two machines have given excellent service. The total capacity of the present plant is 115 kilowatts, which, upon completion of the Glacier Point Hotel, was insufficient for

the requirements. It was necessary at that time to install an auxiliary plant. This consists of a 30-horsepower, 220-volt induction motor, directly connected to the 60-horsepower gasoline motor of a White Good Roads truck. I believe this installation is somewhat unique in the development of electric power, but it has worked very satisfactorily and has enabled us to give service, where without its use we would have been unable to do so.

The total output of the plant for the year was 342,992 kilowatt hours. This is an increase of 69 per cent over the output of the previous year. This shows the necessity for additional electric power facilities and is an argument in justification for the new power plant now under construction. In July, 1916, funds to the amount of $150,000 were made available for the construction of a new power plant in Yosemite Valley. The engineering supervision of this work was intrusted to Galloway & Markwart, civil engineers, of San Francisco, Cal. The plant was designed for a capacity of 2,000 kilowatts, and will consist of a diversion dam, located about 1 mile below the Pohono Bridge, on the Merced River; approximately 6,000 feet of 54-inch wood-stave flow-line pipe; and 700 feet of steel pressure pipe connected to two 1,000-kilowatt generators driven by hydraulic turbines. Construction work on this plant began in September, 1916, and was continued throughout the remainder of the fiscal year. Unforeseen conditions in the dam-site location resulted in changing from a low concrete dam to a log crib dam of much larger dimensions, which, together with the rapid increase in prices of hydroelectric machinery and practically all materials and supplies as well as labor, made it apparent that the appropriation of $150,000 would be insufficient for the completion of the plant. It was, therefore, necessary to submit an additional estimate of $60,000 for consideration by Congress. This appropriation was made available on July 1, 1917, and the work of installation was continued from that date. The new plant will probably be complete and in operation about February 1, 1918.

TELEPHONE SYSTEM.

The telephone system consists of a switchboard of 50 line capacity, 49 lines of which are in use, and 154 miles of telephone line, some 50 miles of which are metallic circuits of No. 9 wire. The remaining circuits are grounded lines built of No. 9, No. 12, or No. 14 wire. As fast as funds are available, the No. 12 and No. 14 wires are being removed and replaced by No. 9 wire, as the former are too light for satisfactory service and are very expensive to maintain. A maximum of 108 telephones have been connected to this system.

Plans have been completed and funds made available for the installation of an additional 100-line switchboard and for the construction of some 25 miles of metallic No. 9 iron wire circuits. Plans have also been approved for the connection of long-distance telephone service to the park switchboard, thus making it possible to get direct long-distance telephone communication from any telephone in the park. This is a convenience that has been greatly in demand and will furnish a service which is of the greatest value, not only in the administration of the park but to the concessioners and visitors to the park.

WATER SUPPLY.

As indicated in my last year's report, the present water supply is wholly inadequate during the months of August and September, which is the season of low water. During those months it is accordingly necessary to turn river water into the mains. This is unsatisfactory, both because of the poor quality of the river water and because of breakage of plumbing fixtures resulting from the additional pressure, and the clogging of pipes and fixtures from the sand carried into the mains in the river water. Careful study of the water supply during the past season reveals the fact that only a compartively small percentage of the available water is being collected in the springs. The original location of the springs and the headworks were dependent, first, upon the water supply; and, second, upon difference in elevation between source of supply and the point supplied. In order to insure sufficient pressure to induce a sufficient flow in the mains at the village for domestic use, it was necessary to collect the water at a point which has been found to be so high that during the dry months, with the attending low-water plane, an insufficient supply is collected.

It is proposed during the coming year to dig a well some 30 or 40 feet below the present headworks for the purpose of collecting additional water

which will be pumped by electric power into the present reservoirs. In this way it is certain that a sufficient supply can be obtained for all necessary uses. A further development can be made which will entirely eliminate the necessity of turning in the river water even for the additional pressure necessary in case of fire, by installing a storage tank at an elevation high enough above the present reservoirs to insure a sufficient pressure in the mains at the village and other points for fire protection. This tank may be filled by pumping from the lower well and so arranged with a system of electrically operated valves that the higher pressure can be turned into the mains in cases of emergency from a central point, such as the telephone central. This is a matter that should be given consideration as soon in the future as funds may be made available for such work.

SANITATION.

Practically no change has been made during the past year in the method of handling the sanitation and sewage disposal situation from that used during some years past. The question of sewage disposal is an important one and as soon as plans for relocation of the village and other contemplated changes in the matter of accommodations for tourist travel have been perfected and are in process of installation, this matter should be taken up with vigor and sufficient funds appropriated to insure the installation of a complete, modern, and up-to-date sewage disposal unit. At that time all public camps, as well as all hotel camps, should be supplied with flush toilets, and a plant should be installed to take care of the proper burning and disposal of all garbage.

MEDICAL SERVICE.

During the past year a cottage was built for occupation by the resident physician and his family, thus allowing the utilization of that portion of the hospital building, heretofore used as quarters, for hospital purposes. A ward was installed containing four beds, which brings the hospital to a capacity of 10 patients. By the utilization of this additional space, together with other minor repairs made to the building, the medical service is now in a position to give reasonably good service, and the available space for hospital treatment should be sufficient for at least a few years.

During the period July 1, 1916, to June 30, 1917, 78 patients were treated in the hospital. The average period of hospital treatment per patient was about seven days. In addition to the above, 1,561 office treatments were given and 518 outside calls were made.

ACCIDENTS AND DEATHS.

Three deaths occurred in the park during the year, all of which were attributed to natural causes and not to accidents.

On July 27, 1916, Charles H. Stegman, age 79, a guest of Yosemite Falls Camp, died suddenly of heart failure in the Camp.

On August 19, 1916, Andrew Alguire, a laborer living in public camp No. 6, died after a period of some two or three weeks of serious illness of tuberculosis. The resident physician had been in attendance during all of this time, but before being called to his attention the patient had reached the last stages of the disease and hopes for his recovery were given up.

On June 27, 1917, Paul Salvador Segale, age 66, after an illness of a week, died from cancer of the stomach. Mr Segale had been in the employ of the Government for many years, during much of which time he had been assigned to the construction of trails. His ability along the lines of trail construction and his long experience in that class of work makes his loss a material one to the park.

In each of the above cases the bodies were removed from the park for burial.

No accident of serious consequence occurred during the year. Three automobile accidents, however, occurred, any one of which might have been serious or even fatal, but fortunately such was not the case.

On July 9, 1916, a jitney bus, operated by the Desmond Park Service Co. on the floor of the valley, through careless driving was overturned on the Happy Isles road, between the village and Camp Curry. The bus contained five passengers, none of whom was seriously injured.

On July 25, 1916, Miss Esther Woodroff, camping with her parents in camp No. 16, through inexperience in the shifting of gears, backed her car over a

10-foot bank into the Merced River. Although the car was completely overturned, Miss Woodroff was able to extricate herself from beneath the car and was not injured.

On July 30, 1916, a Winton car driven by Mr. Urierer was overturned on the Big Oak Flat grade. Mrs. Urierer sustained a broken rib and was treated in the Yosemite hospital. No explanation was ever assigned by Mr. Urierer for this accident. He seemed to be unable to realize why or how he came to drive the car off the grade.

A number of minor accidents were reported throughout the year, most of which were sustained in the performance of their duties by laborers either of the park or of the various concessioners.

FIRES.

Twenty-one fires were reported during the year, all but three of which came under the head of forest fires. Most of them were small and were discovered and brought under control before any damage had been done. The exceptions to the rule was a fire in August, 1916, which started between Crane Flat and the Merced Grove of Big Trees. In this case two rangers with the help of eight laborers succeeded in controlling the fire only after some 50 acres had been burned over. This fire was caused by neglect by the insect-control party operating on the lands of the Yosemite Lumber Co. within the park. In June, 1917, a fire of some note originating outside of the park in the Merced Canyon, some 6 or 7 miles below El Portal, was allowed to spread until it reached to within a few hundred feet of the hotel at El Portal. Rangers and others were sent from the valley and took charge of the fire, which was nearing the park boundary, and in a short time had it well under control. This fire had been burning for some five or six days and apparently no effort had been made by anyone to control it, with the result that it rapidly spread until it approached the park boundary from El Portal northward to a point in the vicinity of McCauley's ranch, on the Davis cut-off road. Quick action was necessary in the vicinity of the park boundary, because if it had gotten out of control undoubtedly it would have reached the heavily timbered section in the Crane Creek area, with disastrous results to a large area of the park timber.

The remainder of the forest fires, as stated above, were unimportant and were caused, as a general rule, by carelessness of campers or of individuals in throwing away lighted cigarettes or cigars or matches. These things are generally thoughtlessly done and it is almost, without exception, impossible to fix the blame.

In November, 1916, a fire started in Boysen's studio, probably from a defective stovepipe. As the fire had a considerable start before being discovered, it was brought under control with considerable difficulty, and then only at a material loss to the studio. Fortunately, however, it was possible to remove practically all of the furniture and photographic equipment and to confine the loss to the building itself.

In June, 1917, the portable buildings used for offices, dining room, and kitchen of the El Capitan Camp were burned to the ground. The fire was caused by a defective burner in the kitchen oil range, and within 20 minutes from discovery the buildings were completely consumed. A week later a fire was discovered on the roof of the Sentinel Hotel, due probably to sparks from the chimney. This was put out at once with little damage.

CLEARING OF THICKETS AND UNDERBRUSH.

The existence of thickets and dense growths of underbrush in certain timbered areas on the floor of Yosemite Valley and in the big tree groves, and the slashings left on the cut-over lands adjacent to the park timberlands along the Wawona road and along the west and south boundaries of the Mariposa Grove of Big Trees, constitute a menace of large proportion in the consideration of fire protection. Fires originating in such thickets or slashings and with a favorable wind may become quickly uncontrollable and large areas are apt to be burned over before fires can be brought under control.

While such work is carried on to some extent in connection with the cutting of wood on the floor of the valley and the cutting of shakes in and around the Mariposa Grove of Big Trees, the importance of the work is such as to warrant a much greater effort. It must be borne in mind that the proper handling of

this work would be expensive, as to clear the lands properly will cost from $20 to $25 per acre, and as there are several thousand acres where these conditions prevail, the ultimate expense will be large. Rather than attempt this work with the idea of an early conclusion and a heavy initial expense, it is suggested that the work be done gradually under relatively small allotments.

INSECT CONTROL.

The work of protection of park forests against depredations by the various species of forest beetles was prosecuted throughout the entire year and with exceptionally satisfactory results. The work was carried on cooperatively with the Bureau of Entomology of the Department of Agriculture, who assigned a forest entomologist to supervise the work. The result is that the yellow and sugar pine areas in the southern and western part of the park have been almost entirely freed from infestation and have now reached the stage where it is likely that no great amount of work will be necessary in the future. A close supervision of the forests, with the occasional cutting of a tree here and there at the proper time, will keep these areas in first-class condition.

In the lodge-pole districts in the vicinity of Lake Tenaya and the Cathedral Creek Basin a more serious condition exists. Before the importance of this work was realized, a considerable proportion of the lodge pole had already been destroyed, and in spite of the considerable amount of work that has been done in these areas it has not been possible to eliminate the danger of further destruction. During the past year nearly 300 trees were treated in this area, but it is still a question whether or not it will be possible to preserve the present living stand, which has become so weakened by constant beetle attacks that the trees no longer seem to be able to offer sufficient resistance, and it may be necessary to continue the work with the idea in view of localizing the attacks and allowing the present stand to be entirely depleted. In other words, it may be necessary to sacrifice what is left of the living stand in these areas in order to protect surrounding areas.

TIMBER OPERATIONS.

Timber operations on private and Government lands within the park have been continued throughout the past year by the city and county of San Francisco, in their development of the Hetch Hetchy project, and by the Yosemite Lumber Co., operating in the southern portion of the park.

The city and county of San Francisco operated their mill throughout the greater part of the year on their Canyon ranch property, located in section 32, township 1 north, range 20 east, Mount Diablo meridian. This operation employed an average of about 40 men per month, and sawed 2,064,085 feet b. m. of lumber. Of this amount, 461,363 feet b. m. was cut from Government lands involved in the exchange between the Government and the city and county of San Francisco, whereby the Government acquires title from the city to 320 acres of land and timber located in sections 5 and 6, township 1 south, range 2 east, Mount Diablo meridian, in exchange for 4,000,000 feet b. m. of lumber located near and contiguous to the Canyon ranch operation.

The operations of the Yosemite Lumber Co. within the park were confined to townships 3 and 4 south, ranges 20 and 21 east, Mount Diablo meridian. This company employed an average of about 225 men per month during their logging season, operated 10 donkey engines, and hauled to 5 landings. Logs were transported over their own railroad to El Portal, thence by Yosemite Valley Railroad to their mill at Merced Falls. The company cut and shipped to their mill 32,727,645 feet b. m. of logs, which was cut from about 882 acres of land, of which approximately 839 acres lie within the boundaries of the Yosemite National Park. Of the park lands 160 acres were cut under restriction, whereby seed trees were left standing and all slashings, débris, etc., will be piled and burned.

In all of these operations the Government interests have been represented on the ground by a special park ranger assigned to that particular work.

PATENTED LANDS.

During the past year an important step has been taken toward acquisition by the Government of privately owned lands within the park. During the year exchanges of land and timber were effected with the Yosemite Lumber

Co. by which the Government acquires title to nearly 7,000 acres of land and 150 acres of timber only. Of this total amount, 790 acres include the timber and were acquired for purposes of protecting roads within the park. The remaining lands are either cut-over lands or lands upon which reservation of the timber has been made. In addition to this, an exchange was effected with the city and county of San Francisco whereby the Government acquires title to 360 acres of land in the vicinity of Hog ranch. In each case, in return for such titles, the Government has granted timber rights on lands in localities where the loss of the timber will not in any way affect the scenic feature of the park. By these two exchanges the Government has acquired nearly 40 per cent of the privately owned lands in the park. Privately owned lands in the park still exist to the extent of about 11,000 acres, but in view of the fact that the Government has no accessible timber which could be disposed of without affecting the scenic features of the park, it will be impossible to acquire further private holdings by this method of exchange. The problem, therefore, of securing funds for the purchase of such lands is one that should be given consideration and attention.

RANGER SERVICE.

During the year the ranger force consisted of one chief park ranger, one assistant chief park ranger, one special park ranger in charge of maintenance of roads, trails, etc., one special park ranger in charge of timber cutting and in connection with operations of the Yosemite Lumber Co. and the city and county of San Francisco, and four regular park rangers. Twenty additional temporary rangers were employed during the months of heavy travel, most of whom were engaged as automobile checkers on the various roads of the park and in traffic and general patrol on the floor of Yosemite Valley.

The policy followed in this park with regard to the police work of the ranger force has been to educate the public rather than to restrict. It has been the effort to imbue rangers with the idea of making as few arrests as possible instead of as many as possible, and of this office to impose as few penalties as possible. It has been the policy to explain to offenders the reason for the regulations and the advisability and necessity for compliance on the part of visitors. In this way, I believe, in many instances, not only have offenders been convinced that the regulations have been made for the good of all, but they have afterwards been instrumental in bringing to the attention of others the advisability of complying with the spirit of the regulations.

The manner in which the ranger force, almost without exception, has entered into the spirit of this policy has been very gratifying. Their work has been difficult, necessitating constant vigilance, and the judgment that has been displayed by them in distinguishing between minor and serious offenses tends to show that the park is fortunate in having been able to obtain the type of men who have represented the ranger service.

INFORMATION BUREAU.

The bureau of information was continued in operation in charge of one of the park rangers during the months of July to October, 1916, and May to June, inclusive, 1917. Park maps and literature pertaining to all national parks are kept here for distribution and sale, and folders and all classes of advertising literature of the various concessioners operating in the park are available for distribution to the public. The registration of campers is also handled at the bureau, and its importance and convenience to the public is attested by the large number of inquiries received. Every effort is made to give strictly impartial information to all inquiries, and because of the ability to get this impartial information it is quite apparent that the public appreciates the bureau's existence.

Lost and found articles are reported to this bureau, where efforts are made to locate lost articles and return them to the rightful owners. Articles to the value of $551 were returned to owners during the past year.

AUTOMOBILES.

Automobiles were admitted to the park during the season of 1917 upon payment of a fee of $5, for which the payee received a permit entitling him to the use of any or all roads within the park and to go and come at will. It will be recalled that during the season of 1916 two forms of permits were issued, one for $5 entitling the holder to a single trip over the roads within the park, and one for $8 entitling the holder to season privilege. As comparatively few people took advantage of the season permit it was recommended that the sea-

son charge of $8 be eliminated and that only one form of permit be issued, which would be considered as a season ticket at a price of $5. This recommendation was approved, and I think the lower price and the additional privileges given with it has had a considerable effect in augmenting the automobile travel during the 1917 season. In spite of the fact that at the beginning of the month of October, 1916, heavy snow blocked the higher roads completely, thus entirely stopping automobile travel to the park for the remainder of that year, and in spite of the late season in the spring of 1917, due to the exceptionally heavy snowfalls in the region, the automobile travel for the period October 1, 1916 to and inclusive of September 30, 1917, shows a very marked increase over that of a corresponding period of the previous year. Three things may be held responsible for the great increase in motor travel—first, the lowering of the rate by the service to $5 for season permit; second, the removal of toll on the Wawona road; and third, the modification of the automobile regulations. By this modification of regulations the motorists were given considerable more liberty than was the case during the previous year, as practically all restrictions were removed with the exception of the adherence of one-way travel on the Wawona and Big Oak Flat grades leading out of the valley. Although this control of traffic on these grades represents somewhat of an inconvenience to the motoring public, the many favorable comments on the scheme, together with the lack of adverse criticism, makes it apparent that the automobilists appreciate the fact that such a regulation is necessary and that it is made for the safety of the traveler. Furthermore, until such time as funds become available for the widening and general improvement of these grades, it is believed that the restriction should remain in force.

The following tables give a comparison of automobile travel for the seasons of 1916 and 1917:

Entrance.	Road.	Automobiles.	People.
SEASON 1916.			
Alder Creek	Wawona	2,370	8,522
Crane Flat	Big Oak Flat	553	1,990
Merced Grove	Coulterville	426	1,524
Aspen Valley	Tioga	106	382
Tioga Pass	do	578	2,075
El Portal	El Portal	6	21
Hog Ranch	Hetch Hetchy	4	13
Total		4,043	14,527
SEASON 1917.			
Alder Creek	Wawona	3,604	12,647
Crane Flat	Big Oak Flat	1,394	4,911
Merced Grove	Coulterville	62	232
Aspen Valley	Tioga	559	1,691
Tioga Pass	do	883	2,915
El Portal	El Portal	17	55
Yosemite	Various	2	5
Total		6,521	22,456
Increase over 1916		2,478	7,929

Because of construction work in connection with railroad, automobile travel was not allowed over the Hetch Hetchy road except under permit from the city and county of San Francisco, and then only for cars entering on business in connection with the Hetch Hetchy work or in connection with park work. Hence this travel does not appear in the 1917 statistics.

MOTORCYCLES.

To date motorcycles have not been permitted in the park. I am not sure that there are any real grounds for the Service to rule against them, but I am inclined to think that the principal reason for not allowing them to enter the park is due to the prejudice that has been developed against them by persons not familiar with the manipulation of the motorcycle. I believe the prejudice has no more grounds than the prejudice that former park officials held against the coming of the automobile. The principal argument that I can see against the motorcycle is that they make a considerable amount of unnecessary noise

by the continued use of the cut-out. As to their use on the high mountain roads, I think they are no more dangerous than the automobile, and if allowed to enter it seems to me the motorcyclist himself would be the only one endangered. I believe it would in no way increase the danger to automobile travel on the mountain roads. So far as the roads on the floor of the valley are concerned, there is, of course, no more danger than on the State highway. I would recommend that motorcyclists be allowed the same privileges as automobilists and be permitted to enter subject to similar restrictions and regulations.

VISITORS.

Visitors to the park during the period October 1, 1916, to September 30, 1917, reached a total of 34,510. The fact that the majority entered the park in private automobiles, and the further fact that the number of people so entering was far in excess of the number traveling by this method during the previous year, is evidence that it is this class of travel that must be given the bulk of consideration in future park development work, both on the part of the Government and the concessioners operating within the park. Roads and public parking places must be given special consideration by the Service; and garage facilities and hotel and camp accommodations which appeal to this class of travel must be maintained by the concessioners.

The following table shows the comparative numbers of people entering by the various means of transportation for the seasons of 1916 and 1917:

	1916	1917
Visitors entering park in private cars	14,527	22,456
Visitors entering by autostage lines other than via El Portal	3,032	2,603
Visitors entering via Yosemite Valley R. R. and El Portal road	14,251	8,612
Visitors entering by wagon, horseback, and on foot	1,580	839
Total	33,390	34,510

The total number of automobile visitors utilizing the free public camps during the season of 1917 was 10,598. This compares with 4,038 for the season of 1916.

Concessions.

Name.	For what granted.	Expiration.	Annual rental.
LEASES.			
Pacific Telephone & Telegraph Co.	Telephone and telegraph lines	Indeterminate.	$100.
Big Trees Auto Stage Co	Automobile stage line	Dec. 31, 1918	4 per cent gross revenues; $1,000 minimum.
(A.) D. J. Desmond Commissary Co.	Hotels, chalets, inns, camps	Dec. 9, 1935	25 per cent net profits first 5 years; 50 per cent net profits thereafter.
(B.) D. J. Desmond Commissary Co.	Transportation	do	
(C.) D. J. Desmond Commissary Co.	General merchandise store and dairy.	Dec. 9, 1925	
D. J. Desmond Commissary Co.	Modifying leases A, B, and C		
Curry Camping Co	Public camp	Dec. 31, 1921	4 per cent gross revenues; $2,000 minimum.
Yosemite Stage & Turnpike Co.	Automobile stage line	Dec. 31, 1932	$100 per year first 5 years; profit sharing thereafter.
PERMITS.			
Dr. Frank P. Ashworth	Dentist	Dec. 31, 1917	None.
D. J. Foley	Studio	Oct. 31, 1917	4 per cent gross revenues; $400 minimum.
Chris Jorgensen	do	Dec. 31, 1917	$200.
Mrs. John Degnan	Delicatessen and bakery	Oct. 31, 1917	$125.
E. N. Baxter	Curios	do	$75.
Geo. Fiske	Studio	Dec. 31, 1917	$20.
J. T. Boysen	do	do	4 per cent gross revenues; $400 minimum.
H. C. Best	do	do	Do.
A. C. Pillsbury	do	do	Do.
Dr. J. S. Brooks	Hospital	Apr. 30, 1918	None.

Lease, special-use, and water-power permits under act of Feb. 7, 1905, segregating lands from Yosemite National Park and placing same in Sierra and Stanislaus National Forests.

Period of concession.	Name of concessioner and privilege granted.	Compensation exacted.
In determinate period.	Yosemite Valley R. R. Co. Lease dated Sept. 5, 1905, grants to company right to construct and operate electric railway along Merced River to park boundary. Rate may be readjusted and fixed by President of United States after expiration of first 3 years under lease.	[1] $1,000
Do.....	Yosemite Valley R. R. Co. Special-use permit issued by Forest Service, approved Feb. 7, 1908, by S. J. Flintham, acting forest supervisor, authorizes construction of diverting dam, pipe line, and water tank for conveying water from a spring and storing in tank for use in operating company's electric road. All timber cut to be paid for under timber-settlement regulations of Forest Service.	
Do.....	City and county of San Francisco, Cal. (transferees of Sierra Ditch & Water Co.). Right of way for reservoir site (known as Cherry Valley Reservoir site), comprising 630 acres of land in the Stanislaus National Forest, under lease granted July 30, 1908, to Sierra Ditch & Water Co. All timber cut to be paid for at stipulated rates from $1.50 to $5 per thousand feet, according to kind of timber cut.	[1] 945
Do.....	Yosemite Lumber Co. Special-use permit, approved by district forester, Forest Service, June 27, 1911, for right to construct logging railroad and inclined tramway in Sierra National Forest, for removal of timber adjacent to company's road. All timber used to be paid for at rate to be fixed by forest supervisor, Sierra National Forest, which shall correspond with prevailing stumpage rates charged on said national forest when timber is cut. Stipulations signed by company June 20, 1911, and approved June 27, 1911, by District Forester F. E. Olmstead, accompanying the permit, require annual payment (outside of charge for live and dead timber, standing and down, cut, damaged, killed, or destroyed along right of way, title to which at time of cutting is in United States) of $1,200 on demand therefor being made by the Secretary of the Interior.	[1] 1,200 [2]
Do.....	Yosemite Lumber Co. Special-use permit, approved Nov. 22, 1911, by E. G. Dudley, acting forest supervisor, Sierra National Forest (Forest Service), authorizes construction and operation of telephone line along inclined tramway and logging railroad in Sierra National Forest.	[3]
Do.....	Yosemite Lumber Co. Special-use permit, approved Nov. 22, 1911, by E. G. Dudley, acting forest supervisor, Sierra National Forest (Forest Service), covers right of way for and authorizes construction and operation of pipe line about one-half mile long from spring on lands segregated from park (in Sierra National Forest) for purpose of piping water from company's inclined tramway and logging railroad to supply boilers of steam-hoisting plant, etc.	[3] 10
50 years [4].....	Merced River Electric Co. (project "A"), final water-power permit granted by Agriculture Department (Forest Service) Apr. 11, 1911, running for 50 years, unless sooner revoked by that department, for right of way for diverting dam and power conduit in Stanislaus National Forest. Annual charge over lands segregated from park based on 1,460 horsepower, at 10 cents per horsepower for first year, with increase of 10 cents per horsepower each succeeding year until maximum charge of $1 per horsepower is reached, annual charge thereafter being at latter rate. Stipulations signed by officers of company Mar. 21, 1911 (and accompanying above permit), provided that payment upon above basis should be made annually in advance from Jan. 1, 1912, permit, however, being approved Apr. 11, 1911, and first payment, $146, being made June 7, 1911; this payment was applied on 1911 calendar year. Amount due for fourth year, 1914, 1,460 horsepower, at 40 cents; horsepower capacity subject to readjustment after expiration tenth year.	584

[1] Per annum, on demand of Secretary of Interior.
[2] Value of all timber cut and paid for on right of way (payment of $406.56 made May 3, 1912, and $334.56 made Oct. 3, 1912), $741.12.
[3] Per annum, in advance.
[4] Unless sooner revoked by Department of Agriculture.

EXCERPT FROM ACT OF CONGRESS APPROVED DECEMBER 19, 1913, GRANTING TO THE CITY AND COUNTY OF SAN FRANCISCO CERTAIN RIGHTS OF WAY IN, OVER, AND THROUGH CERTAIN PUBLIC LANDS IN THE YOSEMITE NATIONAL PARK AND STANISLAUS NATIONAL FOREST ADJACENT THERETO.

Section 7 of the above act provides that for and in consideration of the grant by the United States as provided for in this act, the said grantee shall assign free of cost to the United States all roads and trails built under the provisions hereof; and further, after the expiration of 5 years from the passage of this act the grantee shall pay to the United States the sum of $15,000 annually, for a period of 10 years, beginning with the expiration of the 5-year period before mentioned, and for the next 10 years following $20,000 annually, and for the remainder of the term of the grant shall, unless in the discretion of

Congress the annual charge shall be increased or diminished, pay the sum of $30,000 annually, said sums to be paid on the 1st day of July of each year. Until otherwise provided by Congress, said sums shall be kept in a separate fund by the United States, to be applied to the building and maintenance of roads and trails and other improvements in Yosemite National Park and other national parks in the State of California. The Secretary of the Interior shall designate the uses to be made of sums paid under the provisions of this section under the conditions specified herein.

Section 4 of the act provides that no timber shall be taken, cut, or destroyed within Yosemite Park or Stanislaus Forest except as such may be actually necessary to construct, repair, and operate its reservoirs, dams, power plants, water-power and electric works, and other structures mentioned in the act, but that no timber shall be cut or removed from lands outside of the right of way until designated by Secretary of Interior or Secretary of Agriculture, and the grantee shall pay the full value of all timber and wood cut, injured, or destroyed on or adjacent to any of the rights of way and lands, as required by either of said officers: *Provided*, That no timber shall be cut by the grantee in Yosemite Park except from land to be submerged or which constitutes an actual obstruction to the right or rights of way or to any road or trail provided for in the act.

FISH AND WILD ANIMALS.

The effort begun in the season of 1916 to enforce the park regulations with regard to fishing was continued through the season of 1917. Very few violations have been reported, and in almost all of these cases it has been apparent that the infractions occurred not through malicious intent but rather as a result of ignorance of the fishing limit.

During the season of 1917, 120,000 small fry, furnished by the State fish and game commission, were planted within the park boundaries. Fifty thousand of these were planted in Yosemite Valley in the Merced River and its tributaries, and the remaining 70,000 in the various watercourses along the Tioga road. The number of people fishing, and consequently the number of fish being caught, is increasing rapidly from year to year, and in order that the sport may be maintained it will be necessary to continue the planting or transplanting of fish year by year. In the back country, to where it is particularly difficult to transport the small fry, the work of catching and transplanting matured fish has been continued. As a result many of the small lakes in the high country, which heretofore have contained no fish, are being stocked and within the course of another two or three years will afford excellent fishing.

The State law requiring fishermen to hold fishing licenses has been continued in force by the State fish and game officials, as in 1916. Fishing licenses have been on sale at all of the camps, hotels, and in the store in Yosemite village.

Comparatively little difficulty has been encountered from poaching within the park, although it is certain that the practice of hunting deer along the park boundary, both in and out of season, is more or less in vogue. The most serious menace to the preservation of deer and other game within the park is the hunting that takes place along the park boundary during the autumn months, when the deer are first driven from the high country by the early snows. Attention was called to this in my last report, and it was suggested that the problem might be solved by the creation of a neutral zone or game preserve, where hunting would be prohibited at all times of the year, along the southern and western boundaries of the park. In this way deer which are protected throughout the summer months within the park and become tame would have a place to feed during the winter months where they would be equally well protected. The condition at present is that the deer become tame through protection within the park, and upon leaving the park in the early autumn fall an easy prey to the hunters, it not being a difficult matter to kill deer from horseback or from automobile along the roads without the park boundaries. It is to be noted that a bill for the creating of such a zone was presented to the State for consideration during the winter of 1917, but was not given favorable consideration, on the ground that the fish and game commission did not feel justified in creating game preserves other than those already recommended. It is interesting to note, however, that some 16 game preserves, many of them of lesser importance than this proposed reserve, were created during the late session in various localities in the State.

Mountain lions, the greatest enemy of deer next to man, are, I believe, gradually decreasing in number. During the winter of 1917 some 25 lions were

reported killed in and around the park. When it is considered that it is authentically claimed that each mountain lion accounts for the killing of at least one deer per week throughout the year, the importance of this work can be readily understood.

It is hoped that conditions during the coming winter will be such that it may be practicable to organize, under the direction of the ranger force, parties for the hunting of lions throughout the park. It is believed that this would be a move toward the complete elimination of the mountain lion from this section.

FIREARMS.

Firearms to the number of 1,794, of various classes, were handled by the ranger department during the year. Of these 1,236 were sealed at the park entrances, and 558 were taken up by the park rangers at various points and were later returned to their respective owners. The method of handling firearms was the same as that used through the latter part of the 1916 season. Firearms carried by automobile passengers are sealed at the park entrance and are allowed to remain in the possession of the owner. In this case the number of guns sealed is noted on the permit by the ranger issuing the permit and the seals are in turn broken by the ranger at point of exit. Those brought into the park by people on foot or horseback are taken up and turned into the supervisor's office, whence they are shipped to the owners at the latter's risk. Likewise, in cases where persons are found in the park with firearms which have not been sealed, such firearms are taken up and handled in the same manner. In the latter case, unless the owner can readily explain the reason for carrying unsealed firearms, additional penalties in the way of fines are imposed.

ARRESTS.

Nineteen arrests were made during the year on various charges. Most of these arrests were for apparently flagrant violations of the park regulations. In spite of this, in accordance with the policy of imposing as few penalties as possible, few serious penalties have been imposed. Penalties, where imposed, have taken the form of fines or ejectments from the park, as each individual case seemed to warrant.

GRAZING.

Shortly after the declaration of war in April, 1917, with its accompanying propaganda on the conservation of food supplies, the question of opening the park to grazing was taken up on a large scale. All possible influence was brought to bear by the stockmen operating in the regions around the park. Their arguments in favor of such action by the service were based upon the alleged shortage of feed in the foothills and their alleged patriotic desire to do all possible in assisting in carrying out the policy of conservation of food supplies. Although there was no objection on the part of this office to opening certain areas of the park during the period of emergency, it was evident, however, that upon neither of these principles was based the real reason for the insistence on the part of the stockmen that the park be opened; but, rather, it was evident that advantage was taken of the emergency to open up the question with the hope of getting a permanent footing on the park lands, feeling that the acquisition of permits for this year would strengthen the claim for similar privileges in years to come.

When, in 1891, the park was created, grazing was already established throughout the area without Government regulation or authorization. It took more than 20 years of constant effort to eliminate it, and it was only by the rigorous application of force and more or less arbitrary ruling by the Army that the task was accomplished, and in the end the park lost several hundred square miles of territory through the readjustment of its boundaries. Even then the fight was continued on a small scale, with the result that in 1913 permission was given to certain persons to allow cattle to graze upon the park lands when being driven from one private holding to another, or from the park boundary to private holdings. This privilege was given contingent upon action by Congress on certain bills pending at that time, the object of which was the purchase by the Government of private holdings within the park. Although this legislation was never passed, these individuals have assumed these privileges to be sufficient authorization for the continuation of grazing over some 40,000 acres of park lands in the western portion of the park up until the present

time. It is very evident that none other than these few individuals have benefited by the use of these lands. It might also be pertinent to state that in any arrangement the service may make permitting grazing on this portion of the park these men and no one else will reap the benefit.

In view of the strong demands made the service saw fit to open certain portions of the park to grazing, and during the spring of 1917 permits were issued for the grazing of some 5,000 head of cattle. The bulk of the area upon which grazing was allowed lies in the western and northwestern portion of the park, north and south of the Tuolumne River. In addition to this a small area in the southeastern portion of the park was opened to grazing.

When this question comes up another year, as it undoubtedly will, I would suggest that grazing be allowed within the park on private lands only, and on these under fence. In case it should appear necessary to continue grazing of larger areas, because of the necessity of war conditions, I would suggest that the rate for this service be increased to not less than $5 per head, in order that the Government may get its share of the benefit rather than to allow practically all to go to the few individuals holding permits, as is the case under the present arrangement, whereby the Government charges the sum of 50 cents per head per season.

SEQUOIA AND GENERAL GRANT NATIONAL PARKS.

WALTER FRY, Supervisor, Three Rivers, Cal.

GENERAL STATEMENT.

The Sequoia National Park, set aside by act of September 25, 1890 (26 Stat., 478), and act of October 1, 1890 (26 Stat., 650), is located in Tulare County, Cal. It has an area of 161,597 acres and ranges in altitude from 1,100 to 11,900 feet. The General Grant National Park, set aside by act of October 1, 1890 (26 Stat., 650), is located one-half in Tulare County and one-half in Fresno County, Cal. It has an area of 2,536 acres and ranges in altitude from 5,250 to 7,631 feet. The Sequoia National Park derives its name and much of its interest from the presence of many large groves of "big trees" (Sequoia washingtoniana), and the General Grant National Park was thus named by reason of the "General Grant tree," so widely known for its size and beauty. Both of these parks are situated on the western slope of the Sierra Nevada and contain an aggregation of the most magnificent mountain scenery to be found on the continent. The magnificent forests within their borders contain the greatest groves of the oldest and largest trees in the world.

GENERAL CONDITIONS.

The rainfall and snowfall during the winter of 1916–17 were about normal, but, owing to prevailing cold weather during the spring months, thus preventing the usual rapid melting of snow in the higher elevations, not until July 10 was travel accomplished above the 6,500-foot level. Repair and improvement work was commenced on roads, trails, and telephone lines on April 1 and completed by June 30. The tourist camps, stores, hotels, etc., were opened for the accommodation of the public, and transportation service started on June 1, but not until June 8 did visitors enter the park in large numbers.

IMPROVEMENT AND REPAIRS.

Sequoia Park.—A new five-room one-story frame building, commodious and attractive in appearance, for use as a ranger's dwelling and auto checking station, has been constructed at Cedar Creek on the Giant Forest road at the western park entrance.

A new camp ground has been established at Cedar Creek for the benefit of those individuals who for any reason are unable to make the trip into the Giant Forest in one day. The work was accomplished by excavating the bluff on the upper side of the road and making a fill on the lower side. There is ample room in this camp for the accommodation of 40 automobiles at one time without obstruction of the road. A water system has been developed for this camp by means of a concrete reservoir around a spring, and the water is conveyed to the camp grounds by means of a pipe line 300 feet in length with six outlet hydrants embedded in cement.

A wooden stairway and iron handrailing 346 feet in length has been constructed to the top of Moro Rock, whereby persons can now ascend to the top of the rock with safety and obtain an unobstructed view of the most gorgeous mountain scenery of the park.

Twenty-five acres of additional camp ground has been cleared in the Giant Forest tourist camp as the means of providing sufficient camping space for the park visitors. This camp now comprises an area of approximately 100 acres, all midst the great Sequoia grove.

The water-pipe system in the Giant Forest tourist camp has been extended 5,000 feet in length in order to supply 40 acres of additional camp ground, and the entire camp area now has a bountiful supply of pure mountain spring water.

Twenty-seven miles of the Giant Forest road were graded and right of way cleared of fallen timber, rocks, and landslides.

Seventy-five miles of South Fork, Cold Spring, Tar Gap, Colony Mill, Hospital, and Middle Fork trails were repaired and all evidence of landslides, fallen timber, and washouts was removed.

Ninety-five miles of telephone lines were repaired by righting the telephone poles and splicing the broken wires.

The Atwell Mill ranger's cabin has been provided with new shingle roofing, underpinning, and inside ceiling. The exterior of the cabin was painted.

The four buildings at Wolverton, the roofs of which were crushed by heavy snow, have been repaired.

Construction work is now under way on the extension of the Giant Forest road from its present terminus at Wolverton to the Marble Fork River.

Other important projects, including the fencing of horse pastures for use by tourist stock and the clearing up of the Sequoia groves will be finished by the close of the season.

General Grant Park.—All of the park roads were repaired and are now in good condition.

Work is now being prosecuted on the extension of the water system through the tourist camp grounds and in clearing up the Sequoia grove.

VISITORS.

The past season has witnessed the greatest influx of visitors to the Sequoia and General Grant National Parks since their establishment, and they all seemed to enjoy the parks thoroughly. Many campers and others spent their entire summer vacations in the parks; many gathered for social purposes, for educational discussions, for entertainment of one kind or another, and others for their intense love for the mountains and passion for the splendors of nature and out-of-door life.

TRAVEL.

Travel started into the park on the Elk Park road March 1, on the Giant Forest road May 25, and on the Mineral King road and the General Grant Park roads June 1.

Travel by different entrances, Sequoia National Park.

Giant Forest road	5,110
Elk Park road	6,623
Mineral King road	3,450
Trails, all sources	3,325
Total	18,510

Means of transportation to Sequoia National Park.

Sequoia National Park Transportation Co	280
Automobiles	14,008
Wagons	703
Mounted on horse	2,826
Afoot	693
Total	18 510

Automobiles to Sequoia National Park.

Giant Forest road	944
Elk Park road	894
Mineral King road	496
Total	2,334

Travel by different entrances, General Grant National Park.

Stephens Grade road	13,800
Millwood road	2,074
Lake road	1,226
Trails, all sources	290
Total	17,390

Means of transportation to General Grant National Park.

Kings River-Hume Auto Service Co	1,215
Automobiles	13,890
Motorcycles	56
Wagon	960
Mounted on horse	642
Afoot	627
Total	17,390

Automobiles to General Grant National Park.

Stephens Grade—North road	2,010
Millwood road	148
Total	2,158

PARK RANGERS.

The present park ranger corps for the Sequoia National Park consists of 2 assistant chief park rangers, 1 first-class park ranger, and 8 additional temporary park rangers during the summer months, and for the General Grant National Park 1 chief park ranger is employed throughout the year, and 1 temporary park ranger is employed during the summer season. Also 1 clerk-stenographer is employed during the summer season.

ROADS.

Sequoia Park.—At no time since the creation of the Sequoia National Park has so much been done by the county of Tulare looking to the establishment of a comprehensive and permanent plan of road improvements leading into the Sequoia National Park as has been accomplished in the last eight months.

As the result of a bond election held on March 7, 1917, the county voted bonds, in amount $2,300,000, for the purpose of constructing a series of concrete-paved highways. One of the highways it is proposed to pave is that lying between Visalia and Three Rivers, a distance of 30 miles. As this road intersects the various park roads at Three Rivers, and is the only outlet to the valley below, its improvement will materially benefit all park traffic. Construction work on this stretch of highway is now under way, and no doubt much of the road will be completed in time for the park traffic next season.

The county has also reconstructed 5 of the 12 miles of that portion of the Giant Forest road lying west of the park between Three Rivers and the western park entrance, and is contemplating the reconstruction of the remaining 7 miles in the very near future; thus a splendid county road leading to the Giant Forest road in the park is assured. The county has also built, during the past season, about 5 miles of new road which constitutes a connecting link in the projected road between the Sequoia and General Grant National Parks. This county road will be extended to the park boundary at Clover Creek, where

MAP OF SEQUOIA AND GENERAL GRANT NATIONAL PARKS

119°00'

HUME
PO-Hotel-Store-Gasoline-Oils

DUNLAP
PO-Hotel-Store-Gasoline-Oils

NEFFS MILL
Gasoline-Oils

AUTO CHECKING STATION
Gen Grant Nat'l Park
Camp-Store-Gasoline

BADGER
PO-Hotel Store
Gasoline-Oils

GEN GRANT PARK

FRESNO COUNTY
TULARE COUNTY

KAWEAH
P.O.

SUPERVISORS OFFICE
Information-Complaints
Note Asummer Office can also be maintained in the GIANT FOREST

THREE RIVERS
Hotel-Store-Garage-Telegraph-Express-PO
Pac... mals

OROSI

CUTLER

VISALIA

EXETER

WOODLAKE

LEMON COVE
10 MI

Mill Creek
14 MI
8 MI
6 MI
0 MI
15 MI
12 MI
24 MI
20 MILES

Tenmile Cr
Sequoia L
Redwood Cr
Stony Creek
Big Meadow Cr
Boulder Creek
Roaring River
Bog Creek
Copper Canyon
Sugarloaf Creek
East Fork
Jennie L
Twin Lakes
Josephine L
Tableland
Cottonwood Creek
Dry Creek
Kaweah River
Middle Fork
Marble Fork
Sunwise Fork
Clover Cr
Cow Cr
Cliff Creek
Horse Creek

So Fk Kings R
KINGS RIVER CANYON
Cedar Grove
North Dome 8657
Buck Pk 8995
Grand Sentinel 8514
The Sphinx 9122
Lookout Pk 8527
Sentinel Dome 9127
Avalanche Pk 11264
Horse Corral Meadow EL 7645
Rowell Meadow EL 8606
Mt Morainet 10606
Big Baldy 8211
J.O Pass EL 9410
Cabin Meadow
Mt Silliman 11188
Mt Logan 11226
Mt Stewart 11217
Mt Whitney 14496
Mt Langley 14042
Mt Muir 14025
Mt Tyndall 14018
Mt Williamson 14384
Mt Barnard 14003
Mt Kaweah 13802
Mt Brewer 13570
Mt Clarence King 12905
Mt Gardner 13176
Mt Stanford 13973

it will connect with the Giant Forest road extension, thus joining by an automobile highway the two parks and the Kings River region.

That portion of the Giant Forest road within the park, 29 miles in length, was put in excellent condition for travel early in the spring, and has remained in fairly good condition throughout the season. It has required no additional attention. The Elk Park road, of which there are 10 miles within the park, was repaired by the Mount Whitney Power & Electric Co. early in the season and remained in fairly good condition thereafter. The 11 miles of Mineral King road within the park has been kept up by the county of Tulare, but, owing to the bad location of certain portions of this road and its rough condition, automobile travel thereover was difficult.

General Grant Park.—The 13½ miles of road within the park have stood the travel remarkably well, taking into consideration the enormous traffic they have borne throughout the season.

TRAILS.

There are 242½ miles of trails in the Sequoia National Park, all of which are in good condition, other than about 8 miles of the South Fork, 3 miles of the Tar Gap, and 4 miles of the Little Kern River trails. These trails should have their location changed in many places to better grades and the objectionable rocks therein cleared away.

There are 10 miles of trails within the General Grant National Park, practically all of which are in good condition.

TELEPHONE SYSTEM.

There are 98 miles of telephone lines in the Sequoia National Park system, 68 miles of which is an aerial-circuit system and 30 miles a ground-return system. The latter mentioned should be transformed to an aerial system in the interest of good service.

GRAZING.

Permits were issued to graze 1,305 head of cattle in the Sequoia National Park.

The grazing proposition the season throughout has proven very satisfactory to both stockmen and the park officials. Feed was excellent, and those parties holding permits kept their stock well within the confines of the areas assigned to them. The men and their herdsmen also rendered valuable assistance in fighting forest fires, which threatened serious damage to the park timber at intervals throughout the season.

INSECT CONTROL.

A survey was made of the pine-timber belt of Sequoia and General Grant National Parks during the months of July and August, 1917, to determine the amount of insect infestation, prepare a working plan for its control, and make an estimate of the cost of control.

The survey was conducted under the supervision of the Bureau of Entomology, represented by John Miller, assistant forest entomologist, and in cooperation with the Forest Service, represented by Ralph Hopping, forest examiner.

This office has not yet been furnished with a report as to the findings of the survey, but it is evident that small areas of both sugar-pine and yellow-pine timber in certain localities have recently been attacked by insects, and measures should be provided looking to a speedy extermination of the infestation.

WILD ANIMALS.

Deer and bear are very plentiful. A few elk and wild turkeys have been sighted along the Middle Fork and Marble Fork of the Kaweah River. Grouse, wild pigeons, and rabbits are abundant, but quail are not so numerous as of previous years. During the two winters last past severe weather drove the quail to lower altitudes west of the parks, where hunting parties killed a great many of them. Japanese pheasants were seen along the headwaters of Sequoia Creek. Owing to failure this season of the pine and oak seed crop in the parks, as the means of supplying ample food for the squirrels, they have been forced to migrate to other localities in the State where food is more abundant.

FISH.

Fishing in the parks was excellent, but all those streams within easy access to automobile traffic and in the vicinity of the main tourist camps in the Sequoia Park were soon fished out, and as the result fishing in the streams in these localities was very poor after the middle of July.

While the necessity of an increased food supply is turning the attention of every one to the prevention of waste and the further utilization of undeveloped resources, the United States Government, in whose hands is placed the administration of the wild-life resources of our national parks, should not overlook its share of the work in furnishing methods of utilizing such natural resources of food supply as fish, which can only be accomplished in a satisfactory degree by the establishment and maintenance of a United States fish hatchery in the Sequoia National Park. There are many suitable sites for a fish hatchery in the park, and by this method of procedure an annual output of thousands of tons of choice fish could be produced as food supply for the Nation. This can only be accomplished in a meager way otherwise.

FOREST FIRES.

The following is a report of the fires that occurred in Sequoia Park during the season, cause of their origin, approximate area burned, character of timber destroyed, and amount of damage done:

July 13; cause, lightning; area burned, one-fourth acre; character of timber, brush; no damage.

July 13; cause, lightning; area burned, 1 acre; character of timber, brush; no damage.

July 14; cause, lightning; area burned, one-half acre; character of timber, merchantable; a number of small seedlings and one large fir tree destroyed.

July 14; cause, lightning; area burned, 3 acres; character of timber, brush; no damage.

July 15; cause, lightning; area burned, 2 acres; character of timber, merchantable; three large pine trees badly scorched.

July 16; cause, lightning; area burned, one-half acre; character of timber, brush; no damage.

July 16; cause, lightning; area burned, 1½ acres; character of timber, merchantable; five large pine trees badly scorched and probably will die.

July 16–17; cause, lightning; area burned, 15 acres; character of timber, merchantable and brush; many small seedlings and three large fir trees destroyed.

July 20; cause, unknown; area burned, one-fourth acre; character of timber, merchantable; five large pine trees badly scorched and a number of small pine saplings destroyed.

July 22–23; cause, lightning; area burned, 3 acres; character of timber, merchantable; no damage.

July 31; cause, lightning; area burned, one-half acre; character of timber, merchantable; one large fir tree destroyed and three large pine trees badly scorched.

July 31; cause, lightning; area burned, 1½ acres; character of timber, brush; no damage.

August 1; cause, campers failing to properly extinguish their camp fire; area burned, one-fourth acre; character of timber, merchantable; 21 small pine saplings and 1 large fir tree destroyed.

August 1; cause, unknown; area burned, 3½ acres; character of timber, merchantable; five small pine trees destroyed.

August 2; cause, lightning; area burned, 16 acres; character of timber, brush and merchantable; 3 large fir trees destroyed and 12 large fir trees badly scorched.

August 2; cause, lightning; area burned, 5½ acres; character of timber, merchantable; one large pine and one large fir tree destroyed and six large fir trees badly scorched.

August 3; cause, lightning; area burned, 7 acres; character of timber, brush; no damage.

August 9; cause, unknown; area burned, 4½ acres; character of timber, merchantable; three fir trees and a number of fir saplings destroyed.

August 9; cause, unknown; area burned, 2 acres; character of timber, brush and merchantable; about 200 small pine seedlings destroyed.

Total number of fires, 19; approximate area burned over, 74¾ acres; estimated cash value of timber destroyed by reason of the fires, $168.50; scenic value, unimportant.

The above-mentioned fires were detected soon after their origin and extinguished prior to their rapid spreading; consequently the damage was reduced to a minimum. On every occasion when fires were discovered they were quickly attacked by park rangers and cattlemen and fought vigorously and effectively until finally extinguished. On a few occasions park visitors volunteered their services and rendered assistance of very great value.

Three large fires that started in the national forest west of the Sequoia Park and threatened great damage thereto were extinguished prior to their entering the park by volunteer and paid fire-fighting men working under the direction of park and forest rangers.

GOVERNMENT RECORDS BURNED.

The supervisor's residence, situated in the vicinity of Three Rivers, just outside of Sequoia National Park, where a general headquarters and supply station for the park supervisor was maintained, was burned by a forest and grass fire that swept through the region on August 9, 1917. Record books containing copies of letters that had been sent from the park office prior to July 1, 1910, were burned in the building, also over 4,000 specimens of the flora of the Sequoia and General Grant National Parks that had been collected and prepared for use in an exhibit of the flora of the parks were destroyed.

WEATHER CONDITIONS.

The past season was a dry one, but during the period of July 13 to August 7 several light showers, accompanied by thunder and lightning, passed over the area of the parks. No rain of consequence fell, but many fires were started by lightning. Aside from these disturbances, weather conditions were about normal throughout the season and the atmosphere cool and pleasant.

NEW APPOINTMENT.

Mr. Ansel F. Hall, of Berkeley, Cal., was appointed a first-class park ranger in Sequoia National Park, effective May 17, 1917, to fill the vacancy caused by the removal of Oliver R. Prien.

RECOMMENDATIONS.

The following recommendations are made:

(1) That Congress be requested to provide measures whereby title to the patented lands within the Sequoia and General Grant National Parks may be acquired by the United States Government for park purposes.

(2) That the State of California be requested to cede to the United States Government entire jurisdiction over the Sequoia and General Grant National Parks.

(3) That S. 2021, introduced by Senator Phelan, April 21, 1917, providing for the extension of the boundaries of Sequoia National Park to include the Kings and Kern River Canyons and the crest of the Sierra Nevada Range, receive the early consideration of Congress.

MOUNT RAINIER NATIONAL PARK.

D. L. Reaburn, Supervisor, Ashford, Wash.

GENERAL STATEMENT.

Mount Rainier National Park was created by act of Congress approved March 2, 1899 (30 Stat., 993), and exclusive jurisdiction of the territory so set aside was ceded to the United States by act of the Legislature of the State of Washington approved March 16, 1901. Exclusive jurisdiction of the reservation was accepted by act of Congress approved June 30, 1916.

The park is located in the western part of the State of Washington, immediately west of the summit of the Cascade Mountains, and about 40 miles southeasterly from the southern end of Puget Sound. It is situated largely in Pierce

County, but a portion lies in Lewis County. The main entrance to the park is located near the southwest corner, distant by automobile road 93 miles from Seattle, 56 miles from Tacoma, and 6½ miles from Ashford, on the Tacoma Eastern Railroad, a branch line of the Chicago, Milwaukee & St. Paul Railway.

Longmire Springs, distant 6½ miles by automobile road from the main entrance, is the headquarters within the park of the park supervisor, the Rainier National Park Co., and other concessioners. Longmire Springs is connected by telephone to Seattle, Tacoma, and the principal camps and ranger stations within the park.

Mount Rainier National Park is in charge of a supervisor, who is assisted throughout the year by a clerk-stenographer and three permanent park rangers. During the summer season the local force was increased by 8 temporary park rangers, 9 construction foremen, and from 200 to 250 men.

TOPOGRAPHY.

The northwest corner of the park, by road and trail travel, is about 45 miles southeast from the tidewaters of Puget Sound, an arm of the Pacific Ocean, from which waters and the country surrounding the main object of interest in the park, Mount Rainier, appears during the prevalence of ordinary clear weather as a most imposing spectacle—an ice and snow clad dome 14,408 feet high.

The park reserve is a nearly perfect square, the sides of which are 18 miles in length, and contains, therefore, 324 square miles, or (sections of 640 acres each) 207,360 acres, and is completely surrounded by the lands embraced within the Rainier National Forest.

Near the center of the park is the summit of Mount Rainier, from which radiates a system of glaciers, ranking in importance with any similar system or group of glaciers in the world. There are more than a score of these glaciers, from which originate four important rivers—the Nisqually, the Puyallup, the White, and the Cowlitz—the three first named having large electric-power generating plants located on them at points outside the park, but all dependent upon this glacial system and the waters originating therein. The Cowlitz is as important as the others in this respect, but as yet completed development of power-generating plants has not been accomplished.

The general elevation at the boundary lines of the park of the glacial valleys is 2,000 feet above sea level. From the boundary lines these valleys afford a comparatively easy grade to the lower ends or "snouts" of the various glaciers, approximately an average additional elevation of 2,000 feet. At these glacial snouts the real alpine nature of Mount Rainier National Park territory is opened to the traveler, and from, over, around, and alongside the glaciers trails have been constructed with a view to making the wonders of nature within the park easily accessible as well as to provide patrol routes for the protection of the forests and game. These trails lead to the camps or parks known as Paradise Valley (Camp of the Clouds), Indian Henry's Hunting Ground (Wigwam Hotel), Van Trump Park, Cowlitz Park, Ohanapecosh Valley and Silver Spray Falls, Moraine Park, Grand Park, Mystic Lake, Spray Park, Natural Bridge, Cataract Basin, St. Andrews Park, Glacier Basin, etc.

The main automobile road to this vast wonderland leads out from Tacoma and Seattle and is a highly improved thoroughfare for a greater part of the distance from these cities to the park entrance, near the southwest corner of the park, a distance of 56 miles from Tacoma and 93 miles from Seattle. At the park gate this road is met by the road built and maintained by the Government within the park. The Government end of this road is 20.4 miles in length, leading from the entrance gate (elevation, 2,003 feet) to Longmire Springs (6.6 miles; elevation, 2,750 feet); thence to foot of Nisqually Glacier (5.3 miles; elevation, 3,909 feet); thence to Narada Falls (4.1 miles; elevation, 4,572 feet); thence to the Camp of the Clouds in Paradise Valley (4.4 miles; elevation, 5,557 feet). To this point the road is open to automobiles during the summer months. The road above Nisqually Glacier was opened to automobiles for the first time on June 20, 1915.

FOREST CONDITIONS.

More than 200 square miles of the park lands are densely timbered. Douglas fir, white cedar, Alaska cedar, and hemlock are the predominating varieties. In addition to those named the following varieties are found at various points within the park: Lovely fir, Noble fir, Alpine fir, silver fir, Alpine hemlock, spruce, white pine, black (or lodge-pole) pine, alder cottonwood, quaking aspen, broadleaf maple, vine maple, and smooth-leaf maple.

At an approximate general elevation of 4,500 feet the density of timber growth gradually diminishes until the extreme timber line is reached. The intervening areas, which are usually benches or plateaus on the long, sloping ridges separating the various glacial basins, form beautiful natural parks, in some of which tent camps or hotels are established and to which tourists resort in large numbers for rest and recreation. These natural parks and tent camps serve as bases for the arduous task of ascending to the summit of Mount Rainier, and for exploring the lesser mountain peaks, the glaciers, snow fields, and canyons so numerous within the park areas and in the areas surrounding.

These upland meadows, benches, plateaus, or natural parks are beautifully adorned by nature with flowers and shrubs of infinite variety and color and furnish to the most skilled botanist, not to speak of the amateur and the mere lover of the beautiful, problems in nature study never ending. Nearly 400 varieties of plant life are known to grow within the park.

ROADS.

South Side road.—The Government road from the southwest corner of the park to Paradise Valley, 20.4 miles long, was constructed under direction of the War Department at an original cost of $240,000, and was opened for travel in 1910.

The section of road above Nisqually Glacier was opened to automobiles on June 20, 1915. It is operated on a one-way schedule, by which automobiles leave Nisqually Glacier and Paradise on each hour, passing at Narada Falls on the half hour. This traffic is controlled by three park rangers in telephone communication. The system has proved very satisfactory, and seems to have met with the approval of the public.

During the past three seasons about 15,000 automobiles and 85,000 people have passed over this section of road without an accident.

White River road.—During the seasons of 1914, 1915, and 1916 the Mount Rainier Mining Co., under a permit from the department, constructed a wagon road up the north bank of White River from the ranger station at boundary post No. 62 to Glacier Basin, a distance of about 10 miles.

This road was built for use by the company in connection with its mining operations in Glacier Basin. It follows practically the water grade of White River, which runs from 2½ per cent in the lower sections to 13½ per cent at the extreme upper end. Only one or two short sections are over 11 per cent. It is a single-track wagon road, graded to a uniform grade, 12 feet wide inside of ditches. The bridges and culverts are 16 feet wide and are well constructed. A considerable portion of the road has been surfaced and the company is now operating an auto truck over it.

After the completion next year of the McClellan Pass highway to the ranger station, there will be a strong demand from tourists and park visitors to the north side to use the road.

TRAILS.

Of approximately 200 miles of trails within the park about 120 miles have been improved and are now in first-class condition for tourist travel.

The cut-off trail, 3.1 miles long, constructed last year from forks of the Mowich River to Crater Lake, together with the Ipsut Creek trail, 6 miles long, now under construction, from Crater Lake to the Carbon River, will effect a saving of 15 miles in distance between the southwest entrance and the Carbon River ranger station, and will also facilitate game protection in the vicinity of Eunice Lake, a favorite hunting ground of the past.

ROAD IMPROVEMENT.

The following amounts have been expended on maintenance and improvement of the South Side road from park entrance to Paradise Valley, 20 miles:

July 1, 1914, to June 30, 1915	$32,364.19
July 1, 1915, to June 30, 1916	17,865.94
July 1, 1916, to June 30, 1917	25,560.58
July 1, 1917, to date (approximate)	16,000.00
Total	91,790.71

This work has included general repair and maintenance, consisting of widening, construction of wood and concrete culverts, reshaping and ditching, constructing rock and timber crib retaining walls, guardrails, construction and repair of concrete and wooden bridges, clearing of dead and dangerous timber from the roadside, and surfacing with 6 inches of cement gravel.

During the present season the road is being widened at all points below Nisqually Glacier Bridge to a minimum width of 16 feet. At Narada Falls the parking space has been increased 50 per cent, and the entire 8 miles of road above the Glacier is being made safe by the construction of rock and log parapet walls.

The timber work in the old truss bridge over Van Trump Creek at Christine Falls is badly decayed and the bridge was condemned for the 1917 season. A new 60-foot span bridge has been constructed across the box canyon close in to the falls, which involved some heavy excavation in solid rock on the approaches.

The following amounts have been expended on the construction and improvement of the Storbo road:

By Mount Rainier Mining Co	$38,500
By National Park Service since July 1 (approximate)	5,000
Total	43,500

ROAD SURVEYS.

East Side road.—Location surveys by Engineer J. G. Morgan were made during the 1916 season for an automobile road, starting from the south side road at Inspiration Point (elevation 4,850 feet) above Narada Falls and following via Reflection Lakes, Stevens Canyon, south end of Cowlitz Divide, Ohanapecosh and Chinook Rivers, to connect with the McClellan Pass State highway in Cayuse Pass (elevation 4,600 feet). The survey was made on a maximum grade of 6 per cent and the total length is about 28 miles.

When completed it will open up the park to the Yakima Valley and the entire eastern part of the State and make it possible for automobilists west of the Cascades to completely encircle the mountain, entering the park by the southwest gate and leaving via White River, or vice versa.

The park trail system, which now entirely encircles the mountain, has a total length of about 200 miles.

The trip around the mountain can be made in about seven days, and with proper advertising should become a very popular feature. By making camp each night at certain points in the natural parks and upland meadows the tourist can travel on foot by the shortest route between camps, crossing the glaciers, well above timber line, and obtain a magnificent view of the mountain and surrounding country from all angles, affording one of the most interesting scenic trips in the world.

FIRES.

No fires occurred within the park during the season of 1917, but there were numerous fires outside the park in the surrounding forests, and the smoke drifted into the park at times to such an extent that sight-seeing was impossible except in the early morning hours.

WILD ANIMALS.

Hunting is absolutely prohibited in park territory, and every precaution is taken by park officers to prevent poaching, but the densely wooded nature of the territory adjacent to the park boundary makes it impossible to entirely stop the practice. A great many deer are driven down into the lower elevations by the fall and winter snows. They find their way across the boundary into the favorite hunting grounds, where they are killed in large numbers.

It is recommended that steps be taken to create a game preserve surrounding the park.

A great many deer and bears have been observed in the park during the season. Bears have broken into the meat houses in the construction camps on several occasions and carried away considerable quantities of fresh and cured meats.

MAP OF MOUNT RAINIER NATIONAL PARK

121°55'

121°35'

47° 00'

46° 45'

39 MILES TO TACOMA
61 MILES TO SEATTLE

FAIRFAX
R R Sta · P O - Express
Hotel - Store - Pack Animals

RANGER CABIN

Carbon River

Chenuis Falls

Green Lake

Evans Creek

Marjorie Lakes

Lake Ethel

Lake James

White River

GRAND PARK

Huckleberry Creek

29 MILES TO ENUMCLAW

White River POOR ROAD 7 MI

Eunice Lake

GLACIER SHELTER CABIN

Crescent Lake

Cataract Falls

Crater Lake

Meadow Cr

SHELTER CABIN

Mowich River

Spray

Spray Falls Park

Mt Park

West Fork

SHELTER CABIN

SHELTER CABIN

Mystic Lake

WHITE RIVER ENTRANCE
Register and purchase Automobile Permit

Starbo Mining Camp
No Accomodations

12 MI POOR ROAD

White River

Russell Glacier

North Mowich Glacier

Whitehorse Glacier

Glacier Basin

Puyallup River

Sunset Park

Willis Wall

Steamboat Prow

Emmons Glacier

Summerland

Fryingpan Creek

South Mowich Glacier

SHELTER CABIN

MOUNT RAINIER
EL 14408 FEET

Puyallup Glacier

Tahoma Glacier

Success

Ingraham Glacier

Fryingpan Glacier

Ohanapecosh Glacier

Cowlitz Glacier

Glacier Island

McClure Rock

Paradise Glacier

Ohanapecosh

Chinook Creek

NOTE
Distances given are by road.
There are 200 miles of trail within the Park

NISQUALLY CHECKING STATION
Automobiles going up-grade leave here on the hour

Indian Henrys Hunting Ground

Lunch Pavilion A la carte

PARADISE INN
Lunch Pavilion - a la carte
Garage

PARADISE VALLEY CHECKING STATION
Automobiles going down-grade leave here on the hour

PUBLIC CAMP GROUND

VAN TRUMP PUBLIC CAMP GROUND

Tahoma Creek

Paradise

6 MI

5.4 MI

4 MI

NARADA CHECKING STATION
Automobiles pass here on the half hour

Muddy Fork Cowlitz

Cowlitz Divide

Silver Falls

50 MILES TO TACOMA
90 MILES TO SEATTLE

NISQUALLY RIVER ENTRANCE
Register and purchase Automobile Permit

ASHFORD
R R Sta - P O - Express
Hotel - Store - Garage

6 MI

2.4 MI

4.2 MI

Kautz Creek

LONGMIRE SPRINGS

Supervisors Office
Longmire Post Office
NATIONAL PARK INN
LONGMIRE HOTEL
PUBLIC CAMP GROUND
Store - Telegraph - Garage

Nisqually River

KAUTZ CREEK PUBLIC CAMP GROUND

RANGER CABIN

Scale
1 ½ 0 1 2 3 4 MILES
----Trails
1917

ENGRAVED AND PRINTED BY THE U.S. BUREAU OF ENGRAVING

MINING CLAIMS.

Mining operations are confined to claims located prior to the act of Congress of May 27, 1908, prohibiting the location of mineral claims within the national park.

The Mount Rainer Mining Co. has been operating for several years, under permit from the department, on the development of its claims in Glacier Basin. During the past three seasons it has constructed a wagon road up the valley of White River to Glacier Basin and has installed a sawmill, a power and light plant, an aerial tramway, and has driven several hundred feet of tunnels in addition to the construction of several permanent buildings. Its working force has consisted of from 40 to 50 men working the year round.

In the vicinity of Longmire Springs the Eagle Peak Copper Mining Co. is working toward the development of two claims, and Sherman Evans and Ike Evans two claims. The Eagle Peak Copper Mining Co. has driven a tunnel 410 feet long and installed a power plant, consisting of a 14-inch turbine wheel, operating under a head of 55 feet and generating about 20 horsepower. Water is conveyed from Paradise River through a flume to the wheel. The power is used to operate an 8 by 8 inch Ingersoll Rand compressor with a capacity of 90 cubic feet per minute. Sixty feet of tunnel was driven this year and about 50 feet last year.

The Mount Rainer Mining Co. has made several shipments of ore, which assays about $60 per ton. No shipments, except for test purposes, have been made by the Eagle Peak Co.

MINERAL SPRINGS.

The principal mineral springs, and the only ones of easy access to the tourist, are those located on the patented land at Longmire Springs. Several kinds of mineralized water spring from the ground on this tract. Some of this water has a temperature of 70° F. on reaching the surface. It is heavily charged with sulphur, and a swimming tank is provided in order that visitors may take a "sulphur plunge." Other waters are charged with iron, and still others are sweet, cool, and sparkling.

But little care has been exercised in the past to prevent pollution of these springs. During the past season the property was leased to a company known as the Longmire Springs Hotel Co. This company has constructed 16 new cottages and has done considerable work toward cleaning up the springs and grounds and a new two-story hotel building 50 by 100 feet has been constructed.

The Ohanapecosh hot springs, near the southeast corner of the park, are very hot and are noted for their curative qualities. Very little development work has been done on them, and they are accessible by trail only, 13 miles from Lewis, Wash., or 15 miles from Narada Falls. They are located just south of the park boundary in the national forest. The small amount of land involved should be added to the park, so that it may be properly developed by the park service and made available for use of visitors.

Fine mineralized water has been discovered along the recently constructed West Side trail on the South Fork of the Puyallup River, near boundary post No. 16.

TRAVEL.

Owing to the heavy snowfall during the past winter, which was about the deepest on record, the South Side road was open for automobile travel to Longmire Springs and Nisqually Glacier two weeks later than in the 1916 season.

The following table shows the dates the road was opened during the past three seasons:

To—	1915	1916	1917
Longmire Springs	All winter	May 18	June 4.
Nisqually Glacier	May 15	June 15	June 28.
Narada Falls	June 10	July 14	July 12.
Paradise Valley	June 15	Aug. 24	Aug. 9.

In connection with the above opening dates the following record of travel is shown:

Period.	1915	1916	1917
To June 30	4,751	811	1,177
Month of July	11,306	4,786	8,132
Month of August	13,782	10,574	17,864
Sept. 1 to close of season	5,327	7,818	8,395
Total	35,166	23,989	35,568

The total registration for the season up to October 12 was as follows:

At the main entrance	35,020
At the White River entrance	279
At the Carbon River entrance	165
At the Ohanapecosh entrance	104
Total	35,568

Distribution of visitors:

From Tacoma	8,488
From Seattle	10,217
From other points in the State of Washington	8,876
From points outside the State of Washington	7,987
Total	35,568

Number entering in private automobile	29,304
Number entering by Ashford stage	1,332
Number entering by Tacoma and Seattle stage	1,426
Number entering by rented cars (not operated by Rainier National Park Co.)	2,608
Number entering by motorcycle	186
Number entering by horse-drawn vehicle	149
Number entering on foot	563
Total	35,568

It is estimated that 4,390 people came into the park for camping purposes.

AUTOMOBILES AND MOTORCYCLES.

During the year ended October 12, 1917, 5,894 automobile entrance permits and 94 motorcycle permits were issued.

HOTELS AND CAMP ACCOMMODATIONS.

Rainier National Park Co.—This company, organized in March, 1916, to operate hotel, camp, and transportation service in the park, has completed its second season. Its principal activities have been the following:

Paradise Inn, in Paradise Valley: This hotel was built last year and opened July 1, 1917. There are 44 sleeping rooms in the building and 82 double bungalow tents grouped near by. All rooms in the hotel and all bungalow tents are heated and lighted by electricity. This room and bungalow-tent arrangement provides sleeping quarters for 400 guests and the dining-room and kitchen equipment is such that 600 or more persons may be accommodated for meals. It may be said that the service at Paradise Inn during the season just closing has been fully up to public expectations. Many times during the season Paradise Inn has been filled to overflowing, but the service in all departments has been of high quality and entirely satisfactory to patrons. In fact, Paradise Inn very satisfactorily fills a long-delayed public demand.

New Paradise Camp: This camp is new in plan only. The camp equipment formerly used by John L. Reese is employed. The location this year was the same as in former years, the very deep snows of this season having made it im-

possible to change location of the camp as planned. Apparently the new plan of operation has proven entirely satisfactory to the public. There have been many expressions of approval of the plan and service and no complaints. Under the new plan of operation patrons are allowed to do very much as they like. Furnished tents, with or without bedding, may be rented at very moderate prices. Patrons may have meals at a lunch counter operated by the camp or they may do their own cooking as they elect, the company furnishing fuel to those who desire to cook for themselves. Campers' supplies are sold at New Paradise Camp so that patrons may, in every way, be governed entirely by their own wishes in their manner of living. New Paradise Camp has been liberally patronized during the past season. All of the equipment has been employed most of the season and the camp has many times been filled to overflowing. With the accommodations offered by Paradise Inn and New Paradise Camp, as many as 600 people have been accommodated in Paradise Valley on several occasions during the past season.

Glacier Camp: This camp is located at the terminus, or "snout," of Nisqually Glacier, 5 miles above Longmire Springs. The camp was operated last year, a large tent serving as dining room. Last fall a very attractive log and shingle structure took the place of the tent dining room. The new structure has been in service during the past season. A number of bungalow tents are operated in connection with this camp and provide sleeping quarters. The camp is supplied with electric current and the bungalow tents are heated and lighted in this way. Glacier Camp provides sleeping accommodations for 40 people. A very important service of this camp is that of providing quick service and refreshments of all kinds for automobilists who stop for a short period at this location. The camp has been well operated and has established a good reputation with patrons.

Transportation: An important branch of the company's business is that of handling the stage and automobile transportation within the park and from Ashford and Tacoma to national-park points. Twelve-passenger auto stages handle train passengers from Ashford to all points within the park and seven-passenger touring cars are operated on daily schedule from Tacoma to park points.

National Park Inn.—The franchise to operate this hotel, located at Longmire Springs, is held in the name of the Tacoma Eastern Railroad and expires May 1, 1921.

The building is a 2½-story frame structure 125 feet long and 32 feet wide. There are 36 guest rooms in the main building, and through the use of tents 250 guests may be accommodated. There is, in addition, a very attractive clubhouse or assembly room built of pine logs. Water is taken from the Nisqually River for the operation of an electric-light and refrigerating plant, which also supplies electric light to all Government buildings at Longmire Springs.

INFORMATION BUREAU.

A bureau of information, in charge of Prof. J. B. Flett, park ranger, was maintained at Longmire Springs for the purpose of keeping visitors informed in regard to points of interest in the park, assigning parties to the public camp grounds, etc.

Prof. Flett's intimate knowledge of the flora, trees, and points of scenic interest in the park was a source of much interest. This information was sought by large numbers of visitors.

CRATER LAKE NATIONAL PARK.

ALEX SPARROW, Supervisor, Crater Lake, Oreg.

GENERAL STATEMENT.

Crater Lake National Park was created by act of Congress approved May 22, 1902, and is located on the crest of the Cascade Mountains in southern Oregon, about 60 miles from the California line. It is approximately 13½ miles east and west and 18 miles north and south and contains 249 square miles, including the wreck of Mount Mazama, at one time a giant among the mountains of the earth. Subsequently all that portion above 8,000 feet elevation disappeared—sank into the bowels of the earth—leaving a vast crater 5½ miles in diameter, which gradually filled with pure, crystal water to a depth of 2,000 feet. On all sides of the lake thus formed the walls of the cauldron still tower to a height of from 500 to nearly 2,000 feet.

Crater Lake was first discovered by white men on June 12, 1853. There were 22 prospectors in the party, of whom the leader, Mr. John W. Hillman, then of Jacksonville, Oreg., was the last survivor. Mr. Hillman died in Hope Villa, La., February 19, 1915, at the advanced age of 83 years.

The tract was but little known, even among residents of southern Oregon, when Mr. Will G. Steel, on August 16, 1885, started a movement for the creation of a national park, which was successful only after 17 years of strenuous labor. Then came a long struggle for development, which is just beginning to bear fruit. Probably the first step in that direction consisted in stocking the lake with rainbow trout, which was also done by Mr. Steel, who in 1888 carried a few minnows nearly 50 miles and got them into the waters of the lake in good shape. The fishing now is unsurpassed and the fish are of excellent quality.

ROADS.

A few years ago an appropriation was made by Congress for the survey of a comprehensive system of roads within the park, the main feature of which consisted in a road entirely around the lake, close to the rim whenever possible. This survey was made under the direction of the Secretary of War, two seasons being required to complete it, and a report thereon was submitted to Congress, estimating the total cost, including $65,000 for a sprinkling plant, at approximately $700,000, and recommending that it be placed under the continuing-contract feature in a manner similar to certain harbors. Of this amount an appropriation was made of $50,000 for use during the season of 1913, $75,000 for 1914, $85,000 for 1915, $50,000 for 1916, $50,000 for 1917, and $50,000 for 1918, making a total to date of $360,000.

Under these appropriations grading has proceeded steadily, resulting in the reconstruction of old roads and the building of new ones, until at this time there are 51 miles of well-constructed dirt roads in use, leaving 6 miles of construction for the season of 1918, when the road around the rim will be complete, providing an excellent highway that will soon become famous throughout the world for its unsurpassed scenic beauty and grandeur.

TRAILS.

Three trails were constructed this season, radiating from Crater Lake Lodge—one to the boat landing, 1¼ miles, descending 900 feet on an easy grade; one to Garfield Peak, 1¼ miles, ascending 1,000 feet and affording magnificent views of the lake and many miles of surrounding country; and one to the Watchman, 4 miles, a winding, scenic trail, passable for horses and affording extraordinary views of the lake for the entire distance.

TELEPHONE SYSTEM.

The National Park Service controls 20 miles and the United States Engineer Department controls 34 miles of telephone lines in the park. All service in the park is free. Government messages are transmitted free over 9 miles of commercial line to Fort Klamath, in exchange for 50 per cent of the revenue from private calls to or from the park. The revenue from this service is small and necessitates a switchboard at park headquarters. A movement, however, is under way to obviate the necessity of this switchboard. The United States Engineer Department also has 14 miles of line from the east entrance of the park to Kirk, at the end of the railroad. Considering the temporary construction of much of these lines, the service is very good.

TRANSPORTATION.

A line of automobile stages is maintained by the Crater Lake Co. from Medford, on the main line of the Southern Pacific Railway, and from Klamath Falls, in eastern Oregon, to the park. All first-class tickets between Oregon and California points are good via Crater Lake during the season, with the addition of the stage fare between Klamath Falls and Medford.

HOTELS.

Crater Lake Lodge is located directly on the rim of the lake, 1,000 feet above the water, where comfortable quarters are available for guests. The lodge is a

MAP OF CRATER LAKE NATIONAL PARK

cut-stone building containing 60 rooms, some of which have hot and cold water and other conveniences.

Besides the lodge, Anna Spring Camp, adjoining the park headquarters, 5 miles distant, is maintained at cheaper rates, where comfortable quarters may be obtained, with well-floored tents for sleeping accommodations. A general merchandise store is also maintained at this point, where gasoline and other supplies may be purchased.

Free camping privileges are accorded the public throughout the park, subject only to the rules and regulations of the National Park Service.

WILD ANIMALS.

The park abounds in black and brown bear, black-tailed deer, cougar, lynx, timber wolves, coyotes, pine marten, fisher, several varieties of squirrels, ringtail grouse, the common pheasant, Clark crow, and numerous varieties of birds common to the country at large.

FISH.

There are no fish in any of the waters of the park except the lake itself and Anna Creek, below the falls. Crater Lake is abundantly supplied with a fine quality of rainbow trout. No fishing is permitted except with hook and line and a limit of five in one day is maintained. The fish are large and the flesh is firm. A few have been taken 25 to 28 inches long, weighing from 6 to 7 pounds.

FOREST FIRES.

One small forest fire occurred in the park this season, but it was brought under control before any damage was done. There were many fires outside and at some distance from the park, particularly to the southwest. At times the view of the lake was entirely obliterated by the dense clouds of smoke that rolled in from these fires, but an east wind for a few hours always cleared the atmosphere.

RANGER FORCE.

The ranger force consists of one permanent first-class ranger and three rangers for the months of July, August, and September. Two ranger cabins were constructed this year, one at the east and the other at the west entrance. They were built of logs and are very artistic and well constructed. We now have a cabin at each of the three entrances.

VISITORS AND AUTOMOBILES.

The heavy snowfall in the winter and the late spring delayed the regular tourist travel about three weeks. After much shoveling of snow by the Crater Lake Co., automobiles arrived at park headquarters July 7 and at Crater Lake Lodge July 18, but the roads were not in condition for regular travel until August 1.

The number of visitors and automobiles are as follows:

	Visitors.		Automobiles.	
	1916	1917	1916	1917
East entrance	859	1,174	193	293
West entrance	9,571	5,368	1,293	1,234
South entrance	1,835	5,103	1,163	1,229
Total	12,265	11,645	2,649	2,756

RECOMMENDATION.

I wish to call the attention of the Service to the recommendation of my predecessor, Will G. Steel, in his report of 1916, that a water system be in-

stalled on the rim near the lodge for the use of campers and for other purposes. This water supply is of the utmost importance. Only through the generosity of the Crater Lake Co. in furnishing water to us were we enabled to establish a construction camp of 25 men on the rim instead of 1 mile distant from our trail work.

WIND CAVE NATIONAL PARK.

THOMAS W. BRAZELL, Supervisor, Wind Cave, via Hot Springs, S. Dak.

GENERAL STATEMENT.

The act of Congress approved January 9, 1903 (32 Stat., 765), made reservation of a tract of land in South Dakota, comprising 10,522 acres, to be known as the Wind Cave National Park.

When this act was passed there were several tracts of patented lands within the boundaries of the park, all of which have since been acquired by the Government.

The park, in shape, is almost square and is situated in a semimountainous region on the southern slope of the Black Hills, in the southwestern corner of South Dakota, about 36 miles from the southern boundary of the State and 24 miles from the Wyoming line.

The altitude at headquarters is 4,030 feet and portions of the mountains west of the cave 4,700 feet.

The park is in charge of a supervisor, the only employee on regular salary. During the past summer two park rangers have been employed for guide and general service.

THE CAVE.

The chief attraction is the cave, entrance to which is somewhat north of the center of the park and about 11 miles north of Hot Springs, the most accessible town of any importance.

The main road through the park, comprising 6 miles, constitutes a portion of the Denver-Deadwood highway, the Black Hills part of which is famed for its beautiful and varied scenery.

This road is rapidly gaining the favor of the automobile traveling public, traffic this season exceeding that of last season by approximately 40 per cent.

The Chicago, Burlington & Quincy Railroad and the Chicago & North Western Railway have regular service, with east and west connections, to Hot Springs, S. Dak., and a majority of visitors to the park come from this town.

Hot Springs is the post office and shipping point. The cave has been made accessible to the public by the working out of passageways to admit of easy travel; it has also been necessary to build several stairways, landings, railings, and bridges within the cave. The lower levels to which visitors are conducted are possibly 480 feet below the entrance, and the aggregate length of all routes now open to the public approximates 3 miles.

There is a spring and miniature lake in one place, but aside from these the cave is without moisture, except from condensation of a heavily laden air and seepage from surface here and there. In this way moisture gathers on the ceilings of some chambers and drops to the floors, causing wet spots, though in very few places.

The various formations within the cave are most wonderful exhibitions of diversified beauty and the inimitable work of nature.

The extent and number of the various crevices, cross passages, and chambers which make up the cave no one knows and no one can intelligently guess, though we do know that the part open to the public is a very small fraction in extent of the part that has been explored and not surveyed; beyond this the wildest guess is admissible.

VISITORS.

There seems to be a gradual increase in the number of visitors to the park each succeeding year, the number this year being the highest of record. Every State in the Union has been represented, and several of the foreign countries, though about 80 per cent of the visitors are from this or near-by States.

South Dakota this season has been represented by 50 per cent of the total number, Nebraska by 30 per cent, Iowa by 5½ per cent, Wyoming by 3 per cent, Illinois by 2 per cent, and North Dakota, Minnesota, and Montana each by less than 2 per cent but more than 1 per cent.

It is the custom for an authorized guide (or guides) to conduct visitors through the cave, and as a trip requires about three hours, but two trips each day are

made. The established time of entrance is at 9 a. m. and 2 p. m. As a great many auto tourists do not know of the established hours for starting for cave trips, they can not manage to get here at the right time, and often do not wait for the trip, and can not be accommodated unless extra guides are available. The widest publicity should be given to times of entrance to the cave, which would result in far less disappointment and a very substantial increase in the number of visitors to the interior of the cave.

The pavilion and other camp sites are occupied by one or more camping parties nearly every night during the summer season, but it is seldom anyone remains for a longer time than one day.

Since June 1, 1916, the entrance fee to the cave has been made 25 cents.

ROADS.

The main park road, about 6 miles in extent, is in very fair condition for a dirt road, but calls for continuous attention to keep it so. The general direction of the road is north and south, though it deviates therefrom on account of buffalo fence and topography of the park. The road is of soil interspersed with gravel and rock, and requires considerable work for first-class maintenance. Much work was done during the past year on the park road. The entire way was shaped, smoothed, and cleared of loose rock, grades reduced in many places, curves reduced or eliminated, where practicable, and repeatedly dragged.

It is planned to have sometime in future a good permanent road through the park, and with this end in view each parcel of road built or repaired is, as far as possible, a direct contribution thereto. The practice is showing gratifying results. Work of installing culverts and gutters for adequate drainage is well started and will be pushed to completion as funds are available.

Diverging from the main park road at a point one-half mile south of headquarters there is what is called the Martin Valley and Buffalo Gap road; the park part of this road is in good shape, and with but little work by those interested a very good road from the park to Buffalo Gap would result.

BRIDGES.

The four oldest and largest bridges on the park road are about to collapse and must be replaced by new crossings; no doubt this will be done, when the season is over, and they will be ready for traffic next season, as request for funds for this purpose has been made.

BUILDINGS.

The buildings consist of supervisor's residence, public or registration building, ice house, barn, workshop, camp pavilion, and house over the entrance to the cave. All are in good condition, except that the residence has never been finished upstairs and the house over the cave entrance is badly dilapidated.

WATER SUPPLY.

The source of water supply is a spring about half a mile west of and 150 feet higher than the park residence. An old pipe line serves to conduct the water from the spring to the recently installed supply or storage tank. This reservoir is of rock and cement, and has a capacity of 450 barrels. It is situated at an elevation of 70 feet above the park buildings.

The water is conducted by gravity, through galvanized pipe, to the various outlets in the yard and street and to a sanitary drinking fountain at the public building. Last fall the system was extended to the barn. The supply pipe from the spring to the reservoir, a distance of one-half mile, being too close to the surface of the ground, is affected by atmospheric conditions, the water getting unpalatably warm in summer and very cold in winter. Last winter it was obstructed by freezing, which caused much inconvenience and considerable expense to open up. It is planned to remedy this defect before cold weather. With the above exception the water system has worked perfectly since being built.

The flow from the spring averages about 75 barrels a day and the water is excellent.

STREAMS.

There is a running stream which skirts the northern boundary, meandering on and off the park. This stream is suitable for propagation of trout, with which it was generously stocked this year.

BIRDS.

More than 60 varieties of birds are found here at some time of the year, and all, more particularly those classed as game birds, are noticeably tamer than they are outside the park. Many kinds of birds stay the year round, but most are migratory.

The bobwhite, yellow-legged prairie chicken, and pin-tailed grouse are present within the park, but the prevalence of rainstorms in nesting season was severely destructive to grouse and prairie chickens this season, and the young are very few in number.

PREDATORY ANIMALS.

Coyotes and bobcats (lynx) are common and occasionally a gray wolf is seen. The combined efforts of Forest Service, Biological Survey, park management, and settlers have materially reduced the number of predatory animals in this vicinity.

Weasel, mink, skunk, and porcupine are found here; the first two are rare, the latter numerous. The weasel, mink, and coyote are a menace to bird life. The magpie, a most beautiful bird itself, is the most destructive of all to bird life and should be exterminated.

NATIONAL GAME PRESERVE.

A national game preserve has been established in the park under the provisions of "An act making appropriations for the Department of Agriculture for the fiscal year ending June 30, 1913," approved August 10, 1912 (37 Stat., 293), as follows:

"For the establishment of a national game preserve, to be known as the Wind Cave National Game Preserve, upon the land embraced within the boundaries of the Wind Cave National Park, in the State of South Dakota, for a permanent national range for a herd of buffalo to be presented to the United States by the American Bison Society, and for such other native American game animals as may be placed therein, the Secretary of Agriculture is authorized to acquire, by purchase or condemnation, such adjacent lands as may be necessary for the purpose of assuring an adequate water supply, to inclose the game preserve with a good and substantial fence, and to erect thereon all necessary sheds and buildings for the proper care and maintenance of the said animals, $26,000, to be available until expended."

WILD ANIMALS.

As a natural game preserve there is but one animal, the whitetail deer, that has come under the protection of the park. These are present in small numbers throughout the year, with more in the autumn season, on account of the hunting to the northward which drives them to the park for refuge.

The establishment on the game preserve of herds of bison, elk, and antelope has resulted in an added interest by the public in the park. The location is particularly adapted to this purpose and the animals are doing well. The inclosure is about the western portion of the park and creates a pasture of nearly 4,000 acres.

PERMITS FOR TRANSPORTATION BY AUTOMOBILE.

For the year January 1, 1917, to December 31, 1917, seven permits for transportation of passengers by automobile were issued.

RECOMMENDATIONS.

Employment of a park ranger for the entire year, for guide service and labor.

Appropriate fence to be built for residence yard.

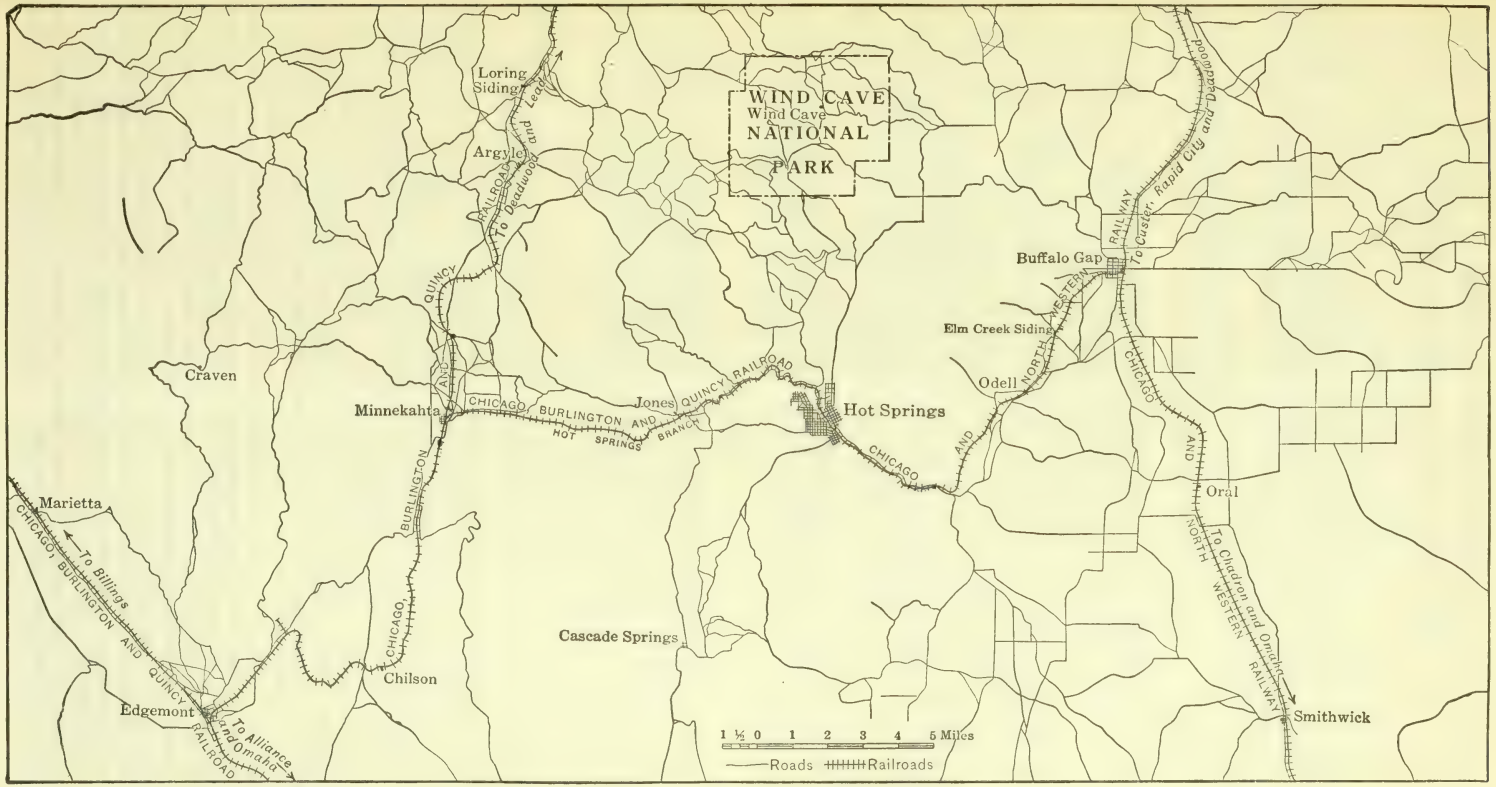
Cement crossing in street, and pavement in front of registration building to be installed and a walk from front around to rear of residence constructed.

New building, of rock, over cave entrance, to be constructed with cement floor.

Four new bridges to be built on park road, replacing old ones.

One mile of road to be surfaced with gravel.

Guardrail to be installed from public building across bridge toward pavilion.



MAP SHOWING RAILROAD CONNECTIONS FOR WIND CAVE NATIONAL PARK.

PLATT NATIONAL PARK.

R. A. SNEED, Supervisor, Sulphur, Okla.

GENERAL STATEMENT.

By the acts of Congress of July 1, 1902 (32 Stat., 641), and April 21, 1904 (33 Stat., 220), 629.33 and 218.98 acres, respectively, at the town of Sulphur, Okla. (then Indian Territory), were segregated as the "Sulphur Springs Reservation," which designation, by joint resolution approved June 29, 1906, was changed to "Platt National Park."

The park, with a total area of 848.22 acres, extends in irregular form a distance of approximately 3 miles from northeast to southwest along Travertine Creek, including a portion of Rock Creek, into which the Travertine empties, and it has a circuit of 9 miles.

There are within the park a number of known mineral and three nonmineral springs. The principal groups of these springs are the Bromide and Medicine Springs (to which has been added the Sodium-Chloride, a new spring recently developed), in the extreme western portion of the park; the Beach, Pavilion, and Hillside Springs in the north-central portion of the park; and the Sulphur-Bromide, Black Sulphur, and Wilson Springs in the south-central part of the park. Sulphur springs predominate.

The Antelope and Buffalo Springs, nonmineral in character, are situated at the extreme northeastern end of the park, with an elevation of 1,080 feet above sea level at the Antelope Spring and 1,078 feet at the Buffalo. They have an approximate discharge of 5,000,000 gallons daily into Travertine Creek and are the source of this beautiful creek. A number of other springs in the bed of the creek add to the volume of water which glides down this stream and forms its pretty waterfalls.

The Medicine Spring was discovered within the last few years, and while it has been confined it is still subject to overflows by Rock Creek and the matter of its proper improvement will be taken up during the present year.

VISITORS.

The weather during the present season for visitors to this park has been unusually pleasant. There have been but few days during the entire season when a cool breeze has not been blowing, and we have just enough rain to keep the roads in good condition for automobile traffic. For the last few years the greater number of visitors to this park have come in cars, and the park roads have proven a great attraction to this class of visitors.

During the present summer the visitors have averaged in number about the same as last season, with this season perhaps leading last during the month of August. I should estimate that about 35,000 people visited the park during this season.

There were registered in the park office during the fiscal year 1,146 persons who came into the park and camped for three days or more, which is more than twice the number who camped in the park during last season. Last year only 547 persons camped here. Among the 1,146 campers during the fiscal year just ended there were three companies of Boy Scouts with their scout masters from adjacent towns, who tramped from their homes to the park and went swimming soon after their arrival.

As shown by the records of the laborer at the Bromide Spring pavilion, the visitors there during the fiscal year just ended numbered 147,889, exceeding the number of visitors for last year by 47,552. As before, however, this total is made up from day to day of visitors and resident citizens who make frequent trips to the springs, and does not represent as many individuals. At the same time the increased number of visitors to these springs indicates a decided increase in the number of individual visitors to the town for this season over last.

The practice of having persons who desire consignments of the Bromide and Medicine waters shipped to them secure physician's orders for same has been discontinued during the year just ended, and license was issued to Mr. Ira E. Pacey to ship these (and other waters of the park) on a percentage basis to the Government, with the privilege of advertising the waters and making shipment to anybody who desires it, but giving preference to invalids during the season for visitors to the park when the Bromide water is often scarce. Under

this privilege Mr. Pacey pays the Government at the rate of 1 cent per gallon on all water shipped, which increased the revenues accruing to the park from the sale of this privilege. During the year there were shipped a total of 7,205 gallons of Bromide water, 2,725 gallons of Medicine, and 270 gallons of the new Sodium-Chloride spring water, a total of 10,200 gallons shipped. Mr. Pacey's records show that these waters have gone into the following States: Minnesota, Nebraska, Wyoming, Colorado, Kansas, Texas, Arkansas, Missouri, Tennessee, Alabama, Ohio, New York, Louisiana, and Oklahoma.

During the year a total of 73,562 gallons of water (including the water shipped) were taken from the springs, which exceeds the total amount taken away last year by 15,472 gallons. Of the 73,562 gallons, there were 50,421 gallons of Bromide, 21,748 gallons of Medicine, and 1,393 gallons of the Sodium-Chloride water taken.

SODIUM-CHLORIDE SPRING.

Because of the scarcity of the Bromide water and the increasing demand for it, in October, 1915, an allotment was made for the purpose of investigation, surveys, etc., relative to a mineral spring (thought to be bromide) which was escaping into the bed of Rock Creek near the Bromide Spring; but due to high waters in the creek and continued rains up to the end of the fiscal year 1915–16 I was unable to have this investigation made during that year, and the allotment was canceled. In January of 1917 a new allotment was made and contract entered into with A. A. Letterman, foreman in charge of construction of the new Bromide Bridge, for building a concrete wall inclosing this spring and carrying it up to a point above low-water level, thus completely isolating the waters of the spring from those of the creek. A sample was taken and sent to the Department of Agriculture for analysis by the Bureau of Chemistry, and it was ascertained that the composition of this water is very similar to that from Bromide Spring, excepting that the new spring contains no iron and 7.2 milligrams per liter of hydrogen sulphid, while the Bromide Spring water contains 8 parts per million of iron oxid and no hydrogen sulphid. Also, the bromin content of the new spring is less than half the amount as shown in the analysis of water from the Bromide Spring. Sodium-chlorid being the predominant hypothetical combination of the component parts of this water, this spring was named the "Sodium-Chloride" Spring. It was deemed by the service so valuable as to warrant completing the inclosure and covering it over (thus preventing overflow by the creek and contamination) and piping over to the spring house for use. This was done at expense of the park revenues, and a pump was provided for conducting this water into a container inside the Bromide pavilion for public use. It has proved to be a great help in supplying the increased demands for the waters of this group of springs.

PAVILION AT BROMIDE.

At the end of the fiscal year 1916 the pavilion over the Bromide Spring which replaced the one destroyed by the flood of January 21, 1916, had been completed with exception of inside plastering, latticework under the pavilion, painting, and the smooth topping which had to be given the cement floor. During the last fiscal year this was done, and both the Bromide and Medicine Springs were provided with earthenware containers and pumps for bringing these waters up into the pavilion for the convenience of the public. On the east end of the pavilion I built during the year 1916–17 a small office building, size 8 by 14 by 10 feet, with flue attached, for use of the laborer at these springs. This office was plastered and finished throughout in exact accord with the main pavilion, and greatly adds to the outside appearance of this building, as well as to its usefulness.

BROMIDE BRIDGE.

On June 26, 1916, formal contract was entered into with the Illinois Steel Bridge Co., of Jacksonville, Ill., for the construction of a steel truss bridge, including concrete piers and abutments, superstructure, flooring, electric-lighting fixtures, and all appurtenances, for the sum of $4,353, the dimensions of same to be 120 feet in length by 10 feet in width, outside measurements. Necessarily this bridge could not be built during the fiscal year and final completion was not effected until April 21, 1917. This bridge was located and installed under the supervision of Mr. A. H. Winter, draftsman of the department, who designed the bridge. It was built about 350 feet upstream from the location of the former bridge, where it could be safeguarded from damage by future floods by throwing

it diagonally across the creek and landing the south abutment on a solid rock foundation at a point where the curve of the creek throws the water against the rock. This leaves a walk between the bridge and the Bromide pavilion, which will have to be improved in a manner to prevent its erosion by the high waters of Rock Creek. This is made the subject of one of my recommendations in this report. At present a temporary walk has been provided, and temporary approaches at each end of the bridge, which will have to be replaced by permanent approaches made of cement and filled in with gravel.

RESIDENCE AT BROMIDE.

Contract was let under date of June 16, 1916, to John T. Chapman for the erection of a four-room bungalow, with screened back porch, pantry, bathroom, and an L porch on the front and side for use as a residence for the laborer at the Bromide Spring, the former residence of the laborer having been destroyed in the flood of January 21, 1916. This residence was constructed during the fiscal year just ended and is a substantial cottage, equipped with all modern conveniences except the drops for electric lights.

ROADS AND TRAILS.

But $275 was spent during the past fiscal year for repairs to roads and trails, due to the fact that I had gotten the roads in the park all in good repair the previous year, and to the further fact that we had very little rain here during the last fiscal year to wash the roads. The flood of January 21, 1916, badly damaged a number of the roads in the park, and a special appropriation was made for repairs to all storm damages, and this enabled me to put these damaged roads in excellent repair during the fiscal year 1916.

COMFORT STATIONS.

During the fiscal year just ended I had three cement comfort stations built in the park, bungalow style, size 10 feet 4 inches by 15 feet 4 inches by 10 feet high, with cement floors. These are divided on the inside into three compartments and have all city sewer and water connections and are provided with lavatories and a small closet for garden tools. Two of these are located in the vicinity of the Bromide Spring and one just northwest of the Lincoln Bridge in West Central Park. Foundation was laid for the fourth station (located in West Central Park), and this has been completed since the end of the fiscal year.

SWIMMING POOL IN TRAVERTINE CREEK.

Allotment was made from the revenues during the last fiscal year for building a dam across Travertine Creek at Sylvan Cove just below Panther Falls for the purpose of enlarging the swimming pool at this location, but this was not quite completed prior to the end of the fiscal year. It has since been finished and is proving an added attraction to the visitors who come to this park. This dam is 67 feet in length, 5 feet high, and 4 feet wide at the bottom, sloping to a 3-foot width at the top.

RECOMMENDATIONS.

Beach Springs (three in number), located just north of the Coney Island ford, should be repaired. These springs are completely submerged with every flood stage of Rock Creek. The waters of these springs are preferred by many visitors to the park, and I feel that they should be improved and a pavilion erected over them. I recommend that the proposed improvements at these springs consist of a large inverted funnel-shaped inclosure, confining the three springs so as to make a combined flow of the three springs from one outlet, the funnel to be constructed of galvanized iron, over which a cement covering should be laid, the approximate measurement of the inclosure to be 600 feet. Surrounding this inclosure to the springs proper should be built a square inclosure to prevent overflow of these springs by the creek. This second inclosure should be about 6 feet high at the creek edge and should bed back into the hill, the depth of the side walls gradually decreasing as the hill rises, but the top of the wall remaining level with the wall along the creek edge, the approximate measurement of this entire wall being 540 square feet.

On the bottom of the outer inclosure should be laid a cement floor, rising with the hill in a succession of 4-foot steps with 6-inch risers, the approximate surface of this floor measuring about 720 feet.

On the top of the outer inclosure to this group of springs, supported by conglomerate columns, should be erected a pavilion, size 24 by 30 by 9 feet, having pagoda roof with a small dog house on the top, supporting a flagpole. The probable cost of labor on this entire improvement, including the pavilion, would be about $900, with a total cost of $2,000, and I recommend that that estimate be submitted to Congress for an appropriation to cover this cost.

It will be noted that my estimate covering cost of this improvement is much greater than estimates in former reports, but this is due to the greatly increased cost of all commodities and labor.

Each year of my incumbency in this office I realize more forcibly the necessity and desirability of a Government owned and operated bathhouse in this park, and I repeat in this report my recommendation of several years past that the Government build this bathhouse, the estimated cost of the building, including equipment, not to exceed $20,000. The supply of water for the bathhouse could be obtained by gravitation from Hillside Spring, while the sewage could be emptied into the manhole of the flush tank on the south bank of Travertine Creek, which is a part of the siphon to line E of the park sewer system, and a distance of about 300 feet from the proposed location of the bathhouse. The material to be used in the construction of this building should be brick and stone, but it is impossible to give the size of the building or the itemized cost of material, labor, etc., without the assistance of an experienced architect.

Around the East and West Central Parks and around the park at Bromide Springs I should like to be able to build an iron fence of two rails of 1½-inch pipe with 2-inch posts set in cement, with ornamental conglomerate rock gateposts at the entrance, the whole to cost not exceeding $3,000. This character of fencing around these parks I desire for the reason that these parks are near the city of Sulphur and are much frequented by visitors to the park, and the old method of fencing with wire, especially for these portions of this park, is not in keeping with what might be expected in a national park. Without fences of some kind around these parks it is impossible to keep campers from stopping overnight in them, or for a noon meal, and leaving them littered up.

I also desire that $1,000 be requested of Congress for the purchase of 10,000 post-oak posts for use in replacing the posts which were used in building the park fences nine years ago. These posts were originally green oak, and many of them are badly decayed, and if they are not soon replaced with new ones the park fences will fall to pieces and have to be replaced entirely, as the wire would rust if allowed to fall to the ground. A great many of the posts have already rotted off at the ground and are now hanging by the wire, and some of the wire has also been rendered useless from contact with the ground.

I shall need $1,000 for building a permanent walk from the new Bromide Bridge to the pavilion over the Bromide Spring along the foot of the bluff. This walk should be built with a strong retaining wall of rock and cement so as to prevent its being washed by the high waters of Rock Creek, and it should be surfaced with either cement or the park native gravel. It would be impossible to decide as to which of these would be preferable until the work was under way. The length of the walk would be about 350 feet, and the cost of labor would be the principal item of expense in its construction, as the rock and gravel are available within the park. Cement would probably be the only commodity which would have to be purchased.

The Cliffside trail is badly in need of repair, especially as to bridges across the small ravines. These were constructed of old lumber when the trail was built, and they should be replaced with cement culverts. The trail has been eroded in many places by the surface waters coming down over the bluff, and these should all be filled in and the trail smoothed off. I estimate that the total cost of improving this trail would be $500, and I recommend that this amount be included in the estimates to Congress.

SUMMARY.

The appropriations above recommended total $34,800. In all cases where recommendations of former years are repeated in this report the costs exceed those in the previous estimates. This is due, as previously stated, to the increased cost of both commodities and labor. While the total asked for necessarily is increased, nothing has been included in my estimate which I do not

consider absolutely essential to the proper development of this park. The numerous natural advantages here should be carefully maintained and improved upon.

This park is so situated that it is probably the only place sufficiently near to the warm Southwestern States for persons of moderate means to be able to avail themselves of the relief from the heat which the cool breezes here afford. The climate here both winter and summer is ideal. It is always warm enough during the winter months to permit of outdoor exercises, and during the summer when people all over the country are suffering from heat prostrations there is a cool breeze blowing in this park. The waters of the park have proved to be of material benefit in the treatment of numerous ailments, and I feel that the Federal Government should be asked to appropriate for its upkeep and improvement in the amounts herein recommended.

MESA VERDE NATIONAL PARK.

THOMAS RICKNER, Supervisor, Mancos, Colo.

GENERAL STATEMENT.

The Mesa Verde National Park was established by the act of June 29, 1906 (34 Stat., 616). It is situated in the extreme southwestern portion of Colorado, in Montezuma County, and originally embraced an area of 66.2 square miles, or 42,376 acres, but by the act of Congress approved June 30, 1913, the boundaries of the park were so changed as to include an aggregate area of 76.51 square miles, or 48,966.4 acres.

CHARACTER OF THE COUNTRY.

Mesa Verde is a high table-land dividing the Mancos and Montezuma Valleys. This mesa is elevated above the valleys some 2,000 feet, and rises abruptly from their floors, with precipitous sides, like the walls of a canyon. The northern extremity of this great mesa terminates in Point Lookout, which juts out between the two valleys, a landmark for miles in all directions. The surface of this table-land is broken by innumerable canyons, which start from the very edge of the mesa on the northern and western sides, and, growing deeper and more rugged as they descend, finally open out into the Mancos Canyon. These canyons have many great caverns in their side walls, with the overhanging rock for roofs, and in these caverns are found the ruins of the cliff dwellings.

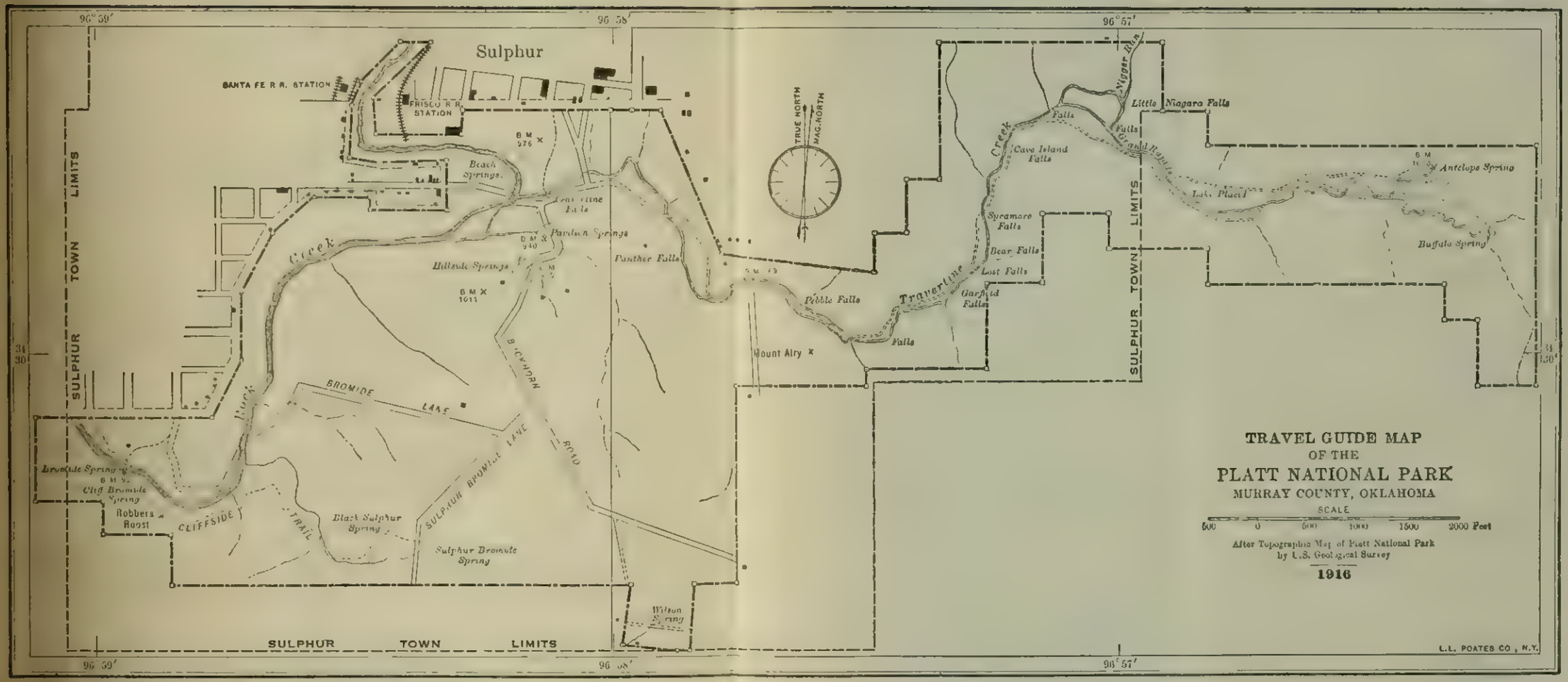
The principal ruins are found in Navajo, Cliff, Soda, Long, and Rock Canyons, though there are hundreds of lesser ruins in all the canyons in the park. Spruce Tree House is in Spruce Canyon, a branch of Navajo; Cliff Palace is in Cliff Canyon; Balcony House is in Soda Canyon; Peabody House and Inaccessible are in Navajo Canyon; Long House is in Rock Canyon; and a recently discovered ruin is in Long Canyon. These ruined houses, or villages, are found in the recesses of the canyon walls and, protected from the weather, are remarkably well preserved. Some of them are small, with only a few rooms, while others are large and must have accommodated a large population. The ruins found on the mesas, without the protection of the overhanging cliffs, have not withstood the ravages of time and are now but mounds of stone and earth.

Park Point, near the northern boundary of the park, is the highest point, with an altitude of 8,574 feet.

At a point in Long Canyon, just below the ruin known as Spring House, has recently been brought to notice a natural bridge, spanning the small gulch that runs down from under Spring House. The bridge is some 90 feet in span and about 25 feet high to the bottom of the arch. To reach this natural bridge a trail from Spruce Tree Camp has been made, a distance of about 5 miles. The trail is a good one, and tourists can visit the bridge either on foot or with saddle horses.

CUSTODIANSHIP.

The custody of the park is delegated by the Director of the National Park Service to a supervisor, whose office is maintained at Mancos, Colo., the nearest railroad point to the park. The supervisor is assisted by a limited number of rangers, whose duty it is to act as guides through the ruins and to police the park. The best of order has been maintained within the park, and the ruins have been protected from vandalism; in fact, no attempts have been made to evade the rules and regulations.


96° 59′
96° 58′
96° 57′
Sulphur
SANTA FE R.R. STATION
FRISCO R.R. STATION
SULPHUR TOWN LIMITS
Beach Springs
Travertine Falls
Pavilion Springs
Hillside Springs
Panther Falls
Creek
Buck
BROMIDE LAKE
Bromide Spring
Cliff Bromide Spring
Robbers Roost
CLIFFSIDE TRAIL
Black Sulphur Spring
SULPHUR BROMIDE LAKE
ROAD
Sulphur Bromide Spring
Wilson Spring
SULPHUR TOWN LIMITS
TRUE NORTH
MAG. NORTH
Mount Airy
Pebble Falls
Travertine
Garfield Falls
Falls
Sycamore Falls
Bear Falls
Lost Falls
Cave Island Falls
Falls
Falls
Falls
Creek
Niagara
Little Niagara Falls
Grand Rapids
Lake Placid
Antelope Spring
Buffalo Spring
SULPHUR TOWN LIMITS
TRAVEL GUIDE MAP
OF THE
PLATT NATIONAL PARK
MURRAY COUNTY, OKLAHOMA
SCALE
500 0 500 1000 1500 2000 Feet
After Topographic Map of Platt National Park
by U.S. Geological Survey
1916
L.L. POATES CO., N.Y.

STOCK.

It has been the custom of the department to lease the grazing lands to owners of patented lands within the park, and at present there are four leases or permits for the grazing of 1,600 head of cattle. The lessees are required to assist in maintaining order and to guard against fires within the park.

ROADS AND TRAILS.

The roads have been kept in good shape for all kinds of travel. That portion of the road under Point Lookout, where the ascent to the mesa is made, has given the usual amount of trouble, but, by using every precaution, no accidents have occurred on this hill. A system of control of travel over this part of the road, through the use of the telephone in the supervisor's office, allows no cars to meet on this hill, cars being held at the top or bottom of the hill, as the case may be, until the road is clear. Two new trails have been made, one from Spruce Tree Camp to Spring House and the natural bridge, and one from Chapin Mesa to Soda Canyon.

WATER SUPPLY.

The water supply varies very little from year to year, as most of the water in the park is derived from springs and wells. The spring at Spruce Tree House holds out at all times and has thus far furnished all the water required, though with building and the increased number of tourists the demand has been much greater than usual.

RUINS.

During the summer of 1916 Dr. J. Walter Fewkes, of the Smithsonian Institution, uncovered a large building near Mummy Lake. This ruin is near the main road into the park and can be seen for a long distance. It was found to be a much older building than Sun Temple, the ruin uncovered in 1915. The name given this ruin is Far-View Pueblo, because from its position on the top of the mesa a commanding view of many miles of surrounding territory may be obtained.

WILD ANIMALS.

Wild animals are increasing each year, and there are many deer now making their home in the park for the entire year. Mountain lions, too, are on the increase, and several pairs are known to live within or near the park. These animals should be killed off, as they prey upon the deer.

AUTOMOBILES.

Automobiles are now generally employed, although the horse-drawn vehicle still makes the trip, and some parties still go in on horseback, following the more romantic trails instead of the road.

MINES.

George S. Todd operates the only mine in the Mesa Verde, but his workings have been, for the entire year, on the land of the Southern Ute Indians.

LANDS.

There are 720 acres of patented lands within the park, and these lands should be acquired by the Government at as early a date as possible, especially the four claims that lie on the mesa, in the heart of the park—the two Prater claims, the Armstrong claim and the Waters claim.

VISITORS.

The number of tourists registering in the park from May 1 to October 12 was 2,223, a much greater number than for the same time last year. The automobile road from Denver has been the means of bringing many parties from the east. The scenery of Wolf Creek Pass and the Mesa Verde Park is unsurpassed.

RECOMMENDATIONS.

The expense of maintaining in good shape the road ascending the mesa has fully demonstrated the necessity for a new road, not only from a safety point of view, but from an economic one. It has cost more to keep this portion of the road passable and in good shape than it has to maintain all other roads in the park for the season. The new road on the east side of the mesa should be constructed at once, so as to eliminate the only dangerous road in the park. New approaches to some of the ruins should be provided. Strong iron ladders, in place of the wooden ones now in use, should be placed, and I would urge the restoration of Peabody House at as early a date as possible.

GLACIER NATIONAL PARK.

GEORGE E. GOODWIN, Acting Supervisor, Belton, Mont.

GENERAL STATEMENT.

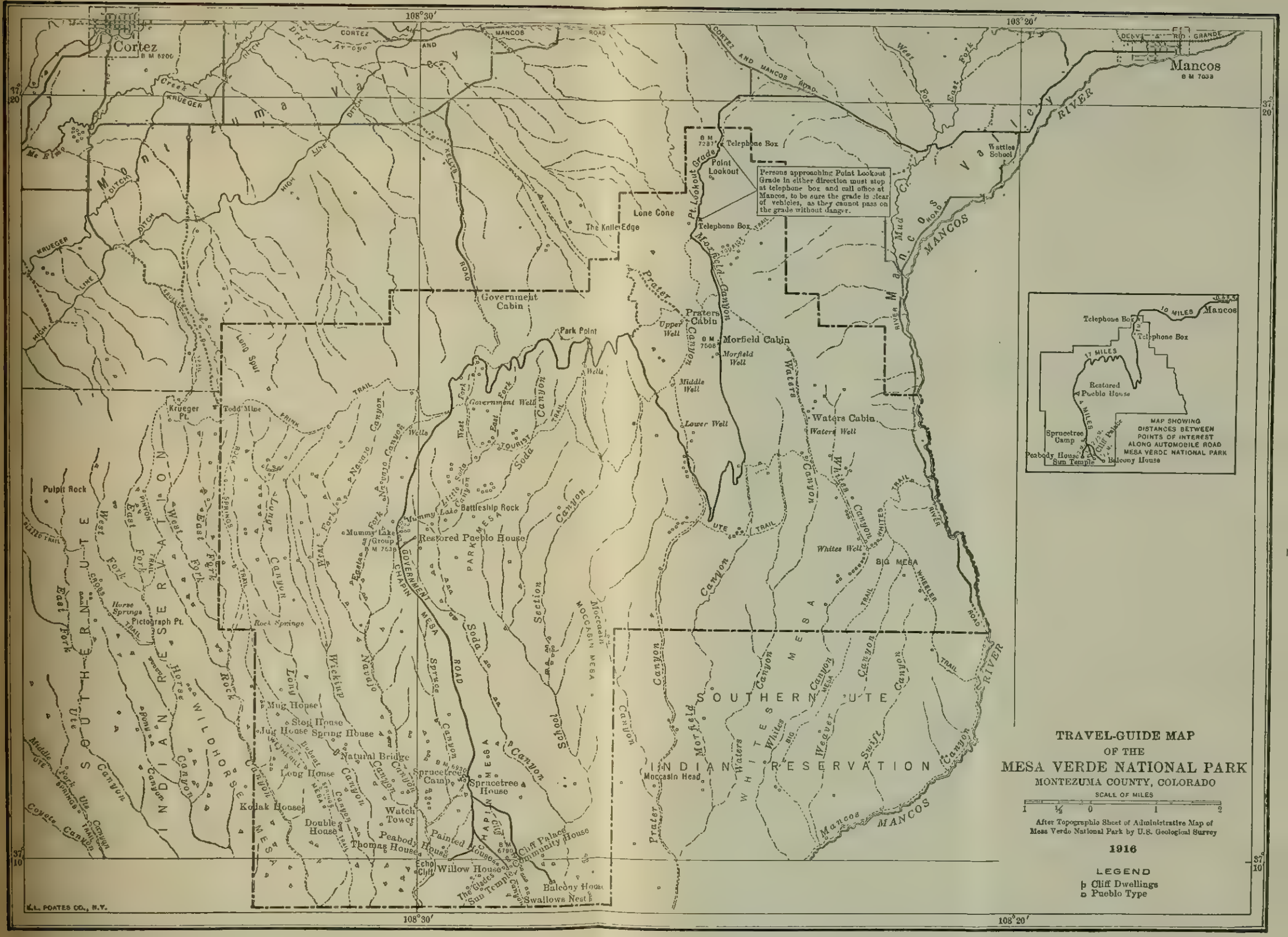
The Glacier National Park was established by the act of Congress approved May 11, 1910 (36 Stat., 354), and is located in northwestern Montana. It embraces 1,534 square miles of the Rocky Mountains and adjacent territory, extending north from the main line of the Great Northern Railway to the Canadian border. The eastern boundary is the Blackfeet Indian Reservation, and the western boundary is formed by the Flathead River. The park, which is irregular in shape, has an area of 981,681 acres. Its greatest length in a northwesterly-southeasterly direction is about 60 miles, with a maximum width approaching 40 miles. Within its borders are attractions for the scientist, nature lover, and tourist unsurpassed by any country in the world, tourists of world-wide experience pronouncing it the Switzerland of America.

The elevations in the park range from 3,100 feet to over 10,400 feet. The high central portions of the area in the northwestern-southeastern axis are formed by the Continental Divide, the peaks and cliffs of which are sharper and bolder than found elsewhere in the United States and are in marked comparison with the open plains of the east and the valleys of the Flathead River on the west. Many of the mountain peaks are difficult to climb, one of which—Mount St. Nicholas, "The Matterhorn"—has never been climbed. Mount Cleveland, the highest mountain in the park, is 10,438 feet in elevation; but the most wonderful of all the mountains is Triple Divide Peak, for from the top of this mountain, and from no other place in North America, one can stand and throw stones into the headwaters of streams flowing northward into the Hudson Bay, into those flowing southward to the Gulf of Mexico, and into those flowing westward into the Pacific Ocean.

Within the confines of the park are 60 or more active glaciers, these ice sheets being the source of beautiful cascades and mountain streams flowing into numerous clear and placid lakes, for which the park is famed. The most noted of these are Lake McDonald, Lake St. Mary, Lake Ellen Wilson, Iceberg Lake, Red Eagle Lake, Kintla Lake, Bowman Lake, Waterton Lake, Quartz Lake, Harrison Lake, Logging Lake, and Two Medicine Lake. Lake McDonald, which is situated at the west entrance, and Lake St. Mary, about 36 miles north of the Glacier Park entrance on the east side of the park, are the two largest and most widely known, and are visited by a large number of tourists each season. They are of easy access and have pleasure launches for the accommodation of visitors. Each lake in the park has a distinct individuality of its own. A special setting of soft, beautifully wooded hills and mountains, or rugged, bold, many-colored cliffs and towering, serrated peaks with dazzling snowcaps, or perhaps blue-white glaciers, all of which present to the eye of the visitor a picture of unsurpassed beauty that is never forgotten.

WEATHER.

The winter of 1916–17 was known locally as a very hard winter. The cold weather came early in the fall and lasted until well on to the following spring, while the snowfall was the heaviest that had occurred for many years. On the 1st of May it looked as though the opening of the trails and roads of the


108°30′
108°20′
37°10′
Cortez
Mancos
Ute Mountain Ute Indian Reservation
Southern Ute Indian Reservation
Mesa Verde
Point Lookout
Telephone Box
Persons approaching Point Lookout Grade in either direction must stop at telephone box and call office at Mancos, to be sure the grade is clear of vehicles, as they cannot pass on the grade without danger.
Lone Cone
The Knife Edge
Government Cabin
Prater Canyon
Prater's Cabin
Morfield Canyon
Morfield Cabin
Park Point
Upper Well
Middle Well
Lower Well
Waters Cabin
Waters Well
Long Soul Trail
Krueger Pt.
Todd Mine
Pulpit Rock
Mummy Lake Group
Battleship Rock
Restored Pueblo House
Park Mesa
Government Mesa
Chapin Mesa
Soda Canyon
Section School
Moccasin Mesa
Horse Springs
Pictograph Pt.
Rock Springs
Mug House
Step House
Jug House
Spring House
Natural Bridge
Long House
Kodak House
Double House
Watch Tower
Peabody House
Thomas House
Painted Houses
Sprucetree Camp
Sprucetree House
Cliff Palace
Community House
Balcony House
Swallows Nest
Willow House
Echo Cliff
The Gladder
Sun Temple
Moccasin Head
Whites Mesa
Big Mesa
Wheeler Road
Wattles School
Mancos River
Mud Creek
Cortez and Mancos Road
Mancos and Cortez Road
Ute Trail
Wickiup Trail
Tour Trail
Rim Trail
Prink Trail
Coyote Canyon
Middle Ute Canyon
Ute Canyon
Wickiup Canyon
Navajo Canyon
Soda Canyon
Chapin Mesa
Prater Canyon
Morfield Canyon
Waters Canyon
Whites Canyon
Weaver Canyon
Swift Canyon
Mancos Canyon
Mud Creek Canyon
Krueger Ditch
Mancos Valley Ditch
High Line Ditch
Kelly Ditch
Cortez Ditch
Mancos Valley Ditch
Mancos River
West Fork
East Fork
Mancos
10 MILES
Telephone Box
Telephone Box
17 MILES
Restored Pueblo House
9 MILES
Sprucetree Camp
Cliff Palace
Peabody House
Sun Temple
Balcony House
MAP SHOWING DISTANCES BETWEEN POINTS OF INTEREST ALONG AUTOMOBILE ROAD MESA VERDE NATIONAL PARK
TRAVEL-GUIDE MAP
OF THE
MESA VERDE NATIONAL PARK
MONTEZUMA COUNTY, COLORADO
SCALE OF MILES
1 ½ 0 1 2
After Topographic Sheet of Administrative Map of Mesa Verde National Park by U.S. Geological Survey
1916
LEGEND
Cliff Dwellings
Pueblo Type
K.L. POATES CO., N.Y.

park to tourist travel would be later than usual, and all indications pointed to severe floods throughout the park. However, the warm weather which started in June was broken up by short periods of cold weather, and as a result the runoff from the mountains occurred gradually and over quite an extended period, and, in the meantime, the weather became sufficiently hot to clear the trails of snow. As a consequence, it was possible to open up the roads and trails of the park earlier than they have been opened theretofore.

The hard winter was followed by an extremely dry summer. Practically no rain fell in the western portion of the park from about the last of June until the date of present writing, September 7, and as a result of this drought a number of forest fires occurred.

VISITORS.

During the 1917 season the number of tourists that visited the park exceeded those of any previous year. From June 1, 1917, to October 12, 1917, there were 14,050 people registered at the two principal entrances of the park, and it is estimated that at least 1,000 other people, who did not enter at these places and who, accordingly, were not registered, visited the park, making a total of at least 15,050. The increase in the number of private vehicles and the number of people entering by private vehicles was quite large, there being 1,121 private automobiles registered at the two principal entrances.

Considering the adverse conditions under which the country is laboring, owing to the war and the unusual business conditions, the number of visitors this year exceeded all expectations and is the strongest possible recommendation as to the popularity of the park, and is indicative of a rapidly increasing growth of travel for the future. The weather, from the point of the visitor, was exceptionally good, as there was but little rain during the tourist season and the average temperature for the summer was somewhat higher than the usual, although as the consequence of the dry weather many forest fires occurred which made the air at times quite hazy and smoky, thus obscuring the mountain views.

ROADS.

There are approximately 130 miles of roads in the park and in the Blackfeet Indian Reservation adjacent to the park, which are repaired and maintained by the service, of which about 100 miles are suitable for use by automobiles, and the remainder, owing to their unimproved condition, are used only by teams and horse-drawn vehicles. All roads in the park have been improved and repaired to some extent during the past year. The principal work completed is itemized as follows:

Glacier Park–Many Glacier automobile road.—This road lies partially on the Blackfeet Indian Reservation and follows a general course parallel to the eastern boundary of the park. It was constructed by the Great Northern Railway Co., but during the past year and a half has been improved and maintained by the service. The principal improvement work on this road consisted of regraveling, widening, installing small drainage structures, and digging small side-drainage ditches. The section of the road which has been graveled lies between the 16 and 23 mileposts, which is from the North Fork of the Cut Bank River through to the Hudson Bay Ridge; from the 25 to the 27 mileposts, which is from Fox Creek through to Divide Creek, and about one-half mile across the St. Marys River Flats just north of the St. Marys River. All of this gravel surface has been put on about 8 to 12 inches thick and from 12 to 16 feet in width, depending on the condition of the road and the width of the roadbed. The thirty-fourth, thirty-fifth, and thirty-sixth miles of the road, in the vicinity of Lower St. Marys Lake, has been regraded and will be regraveled. Most of the bridges on the Babb–Many Glacier section of this road have been redecked and some of the small culverts on the Babb–Glacier Park section have been repaired. The bridge across Two Medicine River has been improved by installation of stringers and has been redecked.

Cut Bank road.—This road, which is approximately 6 miles long, leads from the Glacier Park–Many Glacier road to the park boundary, a distance of about 3 miles, and thence into the Cut Bank chalets. It was originally built by the Great Northern Railway Co., but has been maintained and repaired by the service. Slides and loose rock have been removed during the past season, side ditches cleaned out, and all cross-drainage structures redecked, with exception of the main bridge across Cut Bank Creek.

Two Medicine road.—This road leads from the Glacier Park–Many Glacier road to the park boundary, a distance of about 8 miles, and thence on to the Two Medicine chalets. The road was originally built by the Great Northern Railway Co., and its total length is 14 miles. The rebuilding of about 2 miles of this road was undertaken in 1915, but was not completed until the first part of the fiscal year 1917. This stretch of new road extends from the crossing of the Two Medicine River to the foot of Two Medicine Lake. Aside from the new construction work, the principal repairs and improvements have consisted of removal of two or three small slides and some loose rocks, the redecking of all cross-drainage culverts and small bridges, and the construction of a small bridge across the Two Medicine River to replace a temporary structure.

Belton-Fish Creek Road.—This road, which is 5 miles long, leads from the Belton entrance to the park supervisor's headquarters, and has been maintained during the year. It has been improved by removal of some small slides, cleaning out of drainage ditches, and redecking of culverts. The approach to the Belton Bridge was repaired and the bridge raised 3 feet.

North Fork Road.—This road, which leads from the park supervisor's office at Fish Creek through to the Canadian line, up the valley of the North Fork of the Flathead River, is about 50 miles long. It has a good grade from Fish Creek to McGee Meadows, a distance of about 5 miles. About 20 miles of the road was improved with side drainage ditches, regrading, removal of stumps, construction of new culverts, and installation of quite a large amount of corduroy, most of this work being done between the McGee Meadows and Christensen's ranch and between Bowman Creek and Indian Creek. The road has been kept free from fallen timber and has been made available for use by horse-drawn vehicles. Automobiles have been run over this road from Belton through to the Canadian line and are frequently used between Belton and the Christensen ranch. The Fish Creek–McGee Meadow portion of the road, about 5 miles in length, has been repaired and a number of troublesome earth slides removed and trenched to prevent recurrence.

TRAILS.

All trails throughout the park, aggregating somewhat over 200 miles, were, with exception of the Two Medicine Pass trail and the Avalanche Creek trail and the Mineral Creek and Waterton Valley trails, gone over and put in shape for the season's tourist travel. This work consisted of cutting out windfalls, removing small rock slides, putting in a few small corduroys, or digging drainage ditches and in some places cutting trails through heavy snowdrifts that occurred on steep hillsides.

The new trail construction, revision, and principal repairs done during the season were as follows:

Lake McDonald—Granite Park trail.—Reconstruction of this trail was started last year, and about 7 miles improved. Additional improvements were made this spring over this 7 miles, consisting of corduroying, side-drainage ditches, and reconstruction of certain short sections of the trail, and about 9 miles of additional trail was constructed through to Granite Park, 4 miles of which was built to partial width only in order to permit its being used by the tourist traffic this season. Where construction is completed this trail is cleared to a width of about 10 to 12 feet and graded to a width of about 3½ feet, corduroying and bridges being from 6 to 10 feet in width.

Piegan trail.—About 5 miles of this trail, in the vicinity of Lakes McDermott and Louise and through to Feather Plume Falls, was relocated and reconstructed. It is cleared to an average width of about 8 or 9 feet and graded about 3½ feet. This improvement takes the trail out of a muddy bottom and shortens the distance about 1 mile. About 1 mile of this trail was relocated and reconstructed in the vicinity of Morning Eagle Falls. This improvement shortens the distance over a quarter of a mile and changes the location of the trail so that it avoids the large, heavy snow fields that block the trail in this vicinity each season.

Sexton Glacier trail.—This trail, which leads in to Baring Basin, and construction of which was started last year, was extended about 3¼ to 4 miles this season. The work which was done this year makes it possible for tourists to ride from the entrance to Baring Basin through to the top of Sexton Glacier. Very little clearing was done on this trail. The trail was graded to a width of about three feet, except in rock, where it was graded wider.

MAP OF GLACIER NATIONAL PARK

St. Marys—Gunsight trail.—The trail from St. Marys to Gunsight, along the north shore of St. Marys Creek, has been relocated and reconstructed from Sun Camp to one-half mile beyond Rose Creek, a distance of about 3½ miles. This improvement eliminates the very steep, rough, and tortuous grade between the above points, shortens the distance about half a mile, and gives a uniform grade and at the same time a scenic trail. The clearing of the trail averages about 8 feet in width and is graded about 3 feet wide.

Quartz Creek—Logging Lake trail.—About 8 miles of fire and patrol trail was constructed between Quartz Creek and Logging Lake. Most of the work on this trail was done primarily to get men in to fight a forest fire in this section, and the trail was completed through to make it possible to move fire-fighting crews from one valley to the other. Very little grading was done on the trail, it being cleared to an average width of about 5 feet. This trail will probably be used by tourists who desire to travel from Bowman to Logging Lake.

Middle Fork patrol trail.—In order to patrol the park against fires and poachers, a trail has been constructed from Paola through to Ole Creek, a distance of between 5 and 6 miles. This trail runs near the southern boundary of the park and may be used by tourists who desire to make fishing trips in that section, but its principal use is for patrol purposes. This trail is cleared to about 6 or 8 feet in width and graded about 2½ feet where grading was necessary.

Lake McDonald trail.—Construction of a trail on the east side of Lake McDonald, from the foot of the lake to Lewis's hotel, has been undertaken and will be completed this season. This trail will be cleared out about 6 to 8 feet wide and will be about 9 miles long.

Logan Pass trail.—This trail, which extends from Granite Park along the west side of the Continental Divide through Logan Pass, thence down Reynolds Creek to a junction with the Piegan trail, is under construction. A stretch of about 12 miles is practically completed and about 4 miles more will be roughed out so that it can be used for travel. The grading on this trail varies from about 3 feet in dirt to 6 or 8 feet in the heavier rockwork, quite a good deal of which was encountered. When completed the trail will be about 16 miles long and will be the most scenic and of highest average elevation of any in the park. It will also open to tourist travel the Twin Lakes and Hidden Lake regions, which have heretofore been practically inaccessible except to foot tourists that were good climbers.

Trapper Creek trail.—A trail has been constructed from the McDonald-Granite Park trail up Trapper Creek to the Logan Pass trail near Logan Pass, a distance of about 6 miles. This trail was constructed primarily for the purpose of packing in construction supplies and equipment to the crews employed on the Logan Pass trail. It has rather steep grades, is cleared to an average width of from 6 to 8 feet, and graded 2½ to 3 feet where needed. Although this trail is not built as a tourist trail, it is quite probable that it will be used by tourists desiring to travel from St. Marys Valley to the McDonald Valley via Logan Pass.

Fire trails.—Several miles of fire trails have been constructed during the past season in connection with the work on the forest fires in different places in the park. These trails will be useful for fire-patrol purposes in the future, and some of them may ultimately be developed into tourist trails. About 3 or 4 miles of such trail was constructed up the Little St. Marys Creek; about 3 miles between the old North Fork Road and the top of Apgar Ridge; about 3 miles between the North Fork River and the top of Apgar Ridge; about 2 miles from Tepee Flats into Indian Creek; and several other shorter trails. No grading work was done on any of these trails.

Footpaths.—A walking path from Swiftcurrent Pass to the top of Swiftcurrent Peak, about 1½ miles, was constructed in order that tourists might visit this viewpoint. A walking path was constructed from near Granite Park Chalet to the so-called Rosenwald Reef, a distance of about one-third of a mile. A walking path from near Granite Park Chalet, along the Garden Wall above Grinnell Glacier and through to Gould Mountain, aggregating 2½ miles, has been constructed and will probably be continued through to a junction with the Logan Pass trail near Haystack Butte.

A footpath one-third of a mile long has been constructed from the end of the horse trail to Grinnell Glacier in order that tourists may walk onto the moraines and the glacier.

All these footpaths have been constructed solely with the idea of their being used by pedestrians, and have been made in most cases only a foot or so in width. They will probably never be used as horse trails.

BUILDINGS.

During the year a three-room, one-story, log ranger's cabin was constructed at Nyack, and a two-room, log ranger's cabin was started and is under contract at Cut Bank entrance. At Glacier Park a small temporary warehouse was built for the purpose of storing supplies and construction equipment.

FISH.

Three plantings of trout fry were placed in the lakes and streams during the spring of 1917. Fishing has been excellent throughout most of the year and is much better in the McDermott and St. Marys Lakes than heretofore.

WILD ANIMALS.

Last winter was a cold and unusually severe one, with a larger snowfall than has occurred for years, consequently many of the deer died from cold and lack of browse. The other wild animals, it is believed, wintered well and are as abundant as heretofore. An accurate estimate can not be made of the number of the various kinds of wild animals that are to be found in the park, but the following numbers have been used in previous reports:

Deer.—Both blacktail and whitetail, about 11,000. They range in general throughout the park, but more especially along the western and southern boundaries.

Elk.—The estimate is 900. They are found principally through the eastern and southeastern sections of the park, but are seen at times in other portions of the park.

Moose.—Number, 100. Moose are found practically only in the valleys of the North and Middle Forks of the Flathead River.

Bighorn mountain sheep.—Estimated number, 1,500; found throughout the entire higher mountain area of the park, and more especially through that portion of the park between St. Marys Lake and McDonald Lake and through to Waterton and Kintla Lakes.

Rocky mountain goats.—One thousand two hundred. Goats are found throughout the higher altitudes of the park. Both sheep and goats are believed to be increasing in numbers.

Bear.—No estimate as to number. The brown and the black bear are found in considerable numbers, and are at times quite frequent visitors at the construction and tourist camps in the park. There are also some grizzly bears in the park, but they are seldom seen, and scarcely ever give any trouble.

PREDATORY ANIMALS.

There are a few wolves and a number of coyotes to be found in various portions of the park and some mountain lions. During the past winter a number of mountain lions were killed by hunters licensed by the service for this purpose.

FUR-BEARING ANIMALS.

The usual fur-bearing animals, such as mink, lynx, weasel, and marten are found quite abundantly throughout the wooded sections of the park. There are also some beaver.

WILD FOWLS AND BIRDS.

In the west portion of the park are found a good many grouse of the blue, ruffed, and pin-tail varieties. In the eastern portion prairie chickens and ruffed grouse are found, and at the higher altitudes ptarmigan are often seen. The lakes and streams along the foothills of the park abound with ducks and geese during the season. Many small birds are also found in the park, but for some reasons are not so prevalent in this park as in many similarly located sections.

WILD ANIMAL PROTECTION.

The wild animals within the park are afforded such protection as the ranger force is able to give. During the past year no one has been arrested for poaching, although signs of poaching have been discovered. The people who did the poaching were not seen, and could not be apprehended. During the early spring of 1917 quite a number of elk that had drifted out of the park in the vicinity of the Two Medicine and Cut Bank streams, on the east side of the park, were killed by the Blackfeet Indians. Efforts have been made to have this prevented in the future.

RECOMMENDATONS.

Of the various physical improvements needed for the park, administration buildings are among the most important. The small two-room log shack at Fish Creek, on the shore of Lake McDonald, which has been used as an office since the establishment of the park, is absolutely inadequate and unfitted for office use, being in a decaying condition and not one-fourth large enough, and the out-of-the-way location makes it very difficult to transact the administrative affairs of the office. To remedy this condition, Mr. Stephen T. Mather, Director of the National Park Service, purchased a private holding of about 160 acres situated within the park on the Belton-Lake McDonald road at the Flathead River and donated it to the park as an administrative site. The old buildings that are on this land are unsuited for administration buildings and are not worth remodeling or repairing, and there should be a suitable administration building erected, one that is large enough to care for the rapidly growing needs of the park. A supervisor's residence is also badly needed, as with the rapidly increasing travel and growing importance of the supervisor's duties he will be obliged to entertain considerably and should have a house that will admit of this. Both buildings should be of simple but substantial design and should harmonize architecturally with their surroundings.

The old log bridge across the Middle Fork of the Flathead River at the Belton entrance is in bad repair and no longer safe. An item was included in the last estimate for a concrete bridge across the river from Belton to the new administrative site, but no appropriation was made for the purpose. A new bridge should be built next year—a high-level concrete bridge—across from Belton to the administrative site, if possible; but if the funds can not be secured for this purpose, then a short-span steel bridge should be erected near the old bridge and the road from the bridge to the administrative site raised so that it will not be inundated during the high-water periods.

At the Glacier Park entrance of the park there are no buildings for the storage of supplies and equipment or for administrative purposes. The Great Northern Railway Co. has agreed to deed to the park sufficient land at a convenient location for the purpose of erecting a storehouse and a small administrative building, with sleeping quarters for a storehouse clerk, a residence for the chief ranger, and a small combination stable and garage. These buildings would greatly facilitate the work and reduce the cost of the supplies that are used on the physical improvements of the park.

In order to properly patrol the park, several additional ranger's cabins should be built, so that rangers may be stationed in the locality where they are most needed; also several small patrol and shelter cabins should be built for the use of the rangers on long patrols. On some of the longer walking trails shelter cabins should be erected for the use of the walking tourists that may become storm bound. The cost of these various buildings would be small, and their expense would be well repaid by the increased efficiency of the ranger force and the safety and pleasure of the tourist.

In this age of automobile travel, the road system of the park is the vital factor in its development. The present roads are not sufficient to develop the park properly. On the east side of the park the roads now in use will, if improved by widening, straightening, and graveling in places, serve the demands of travel for a time, but the west side of the park is badly in need of additional roads. There should also be a road connecting the east side of the park with the west side, in order that the park may be toured by automobiles on both sides without shipping cars across the mountains by railroad. A road should be constructed from the foot of Lake McDonald to the head of the lake. This road could be built on either side of the lake. There is also a growing demand for the opening up of the northwest part of the park to auto travel. This necessi-

tates the improvement of the present North Fork wagon road, a mere wagon trail for much of its distance. This road is nearly 50 miles long, but only about 10 miles of the southern end of it may be used by automobiles, and that only during the dry summer season. The remainder of the road north to Kintla Creek should be improved by grading, draining, and bridges. Owing to the many private holdings in the northwestern section of the park and the commercial use to which this road is being constantly put by residents of the county, the county of Flathead should contribute toward the expense of this improvement to the extent of the taxes collected within the park boundaries.

Before the best and most economical location for an east and west road across the Rocky Mountains can be determined it will be necessary to investigate and estimate the several practicable routes, and at least $10,000 should be appropriated for such surveys and estimates.

It will never be possible to completely tour the park and see its many wonders and inspiring views other than by horses or on foot, hence numerous horse and foot trails are a necessity. There are at present between 200 and 300 miles of trails, varying from game trails that are difficult and dangerous to traverse to two of the finest trails built—the Swiftcurrent Pass trail and the Iceberg Lake trail. The majority of the trails, however, owing to lack of funds, have never been sufficiently improved for easy tourist travel, and more trails should be constructed at once to develop the park to meet the present needs. A horse trail is needed from Granite Park to follow along the west side of the Garden Wall and through Logan Pass to St. Marys Lake. Other trails are needed from Browns Pass to Kintla Creek, and from St. Marys River over Logan Mountain to Red Eagle Basin, which will give access to the Blackfeet, Red Eagle, and Pumpelly Glaciers; also trails to Sexton and Grinnell Glaciers.

Walking paths are also needed to bring out the rarest viewpoints. Paths should be constructed along the crest of the Garden Wall, to the top of some of the peaks near Granite Park, Sperry, and Going-to-the-Sun Chalets, and Many Glacier and Glacier Hotels. These paths will cost but little and will be of great advantage to the general tourists and to those who are guests of the hotels and chalets.

Boundary trails for ranger patrol purposes and fire fighting and patrolling are badly needed along the west and south sides of the park to supplement the few boundary trails that are now in this section. These patrol trails could also be used for tourist travel, but should not be built for scenic purposes.

This park is popular as a place for private camping parties, and, to meet the wants of the campers, several camping sites should be prepared by clearing from underbrush, the erecting of toilet buildings, etc. The greatest present need for these sites is upon the shores of Lake McDonald.

The telephone system in the park is not adequate to meet the demands of the service. There is no means of communication between the east and west sides of the park except by Western Union Telegraph. A telephone line should be constructed on the east side, connecting the various ranger stations and construction camps with each other, and a connecting line then constructed between the east side and the west side of the park. It is probable that the best location for this line would be along the railroad, as this is about the only pass through which this service could be maintained throughout the winter. The expense of this line would be quite considerable, but the advantage of a telephone line throughout the park would justify the expense.

The present ranger force consisting of a chief ranger and 13 first-class rangers, is not sufficiently large to patrol the park against poachers during the hunting season and against fires during the dry summer season, or to properly police it during the tourist season. The ranger force should be increased to 1 chief ranger, 2 assistant chief rangers, and 14 first-class rangers; and to this force should be added the necessary road patrols and auto checkers during the tourist season.

Nearly every spring a good many elk, which range through the park most of the year, drift down into the foothills on the eastern side of the park in the vicinity of the Cut Bank and Two Medicine streams and are killed by the Indians of the Blackfeet Indian Reservation, who claim their treaty permits them to kill this game. The Indian Office has been requested to take such steps as may be necessary to prevent this, if possible, and if this is not possible under the law then some legislation should be enacted to prevent the killing of these almost tame elk, and especially the cows and calves.

The various private holdings of land that are scattered throughout the park make its administration difficult, especially with respect to hunting, burning

of brush by homesteaders during the dry season of the year, and the trespassing of the privately owned stock on the park land. Suitable legislation should be enacted which would permit jurisdiction by the National Park Service over the above matters. This is necessary in order that the wild animals may be afforded the proper protection and that the forest fires in the park which are caused by brush fires of the homesteaders getting beyond their control can be, in a measure at least, eliminated.

The sundry civil act approved June 12, 1917, authorized the necessary repairs to roads from Glacier Park station through the Blackfeet Indian Reservation to various points on the boundary line of Glacier National Park. Additional legislation should be enacted, however, which will permit the regulation of traffic and police jurisdiction over these roads similar to that exercised within the boundaries of the park. This is necessary in order that traffic regulations as to speed, irresponsible driving, etc., can be put into effect, and also so that the road will not be damaged by heavily loaded freight wagons during the spring and winter months when they are in a soft and muddy condition. In order to best secure this result, it is believed that the eastern boundary of the park should be moved so as to embrace all portions of the Glacier Park-Many Glacier highway, or at least that the police jurisdiction of the National Park Service should be extended so as to embrace this area, and that this jurisdiction should not only include the regulation of traffic over the roads, but that it should include the enforcement of regulations with respect to the hunting and killing of wild game within this additional area, for if this is done, it is doubtful if but few, if any, elk or other game would range outside of these limits.

In concluding this report I desire to express my appreciation of the harmonious relations that have existed and the cooperative assistance that has been rendered during the past season to the office of the supervisor by the various concessioners who are operating in the park under contracts and privileges granted by this service, which have tended toward more successful administration and have secured more satisfactory results in entertaining and caring for the park travel.

ROCKY MOUNTAIN NATIONAL PARK.

L. C. Way, Chief Ranger in Charge, Estes Park, Colo.

GENERAL STATEMENT.

The Rocky Mountain National Park was created by the act of January 26, 1915 (38 Stat., 798). Under the act approved February 14, 1917 (39 Stat., 916), entitled "An act to add certain lands to the Rocky Mountain National Park, Colorado," approximately 43 square miles have been added, making the present area of the park approximately 400 square miles. Exclusive jurisdiction over this area has not as yet been ceded to the Federal Government by the State of Colorado.

TRAVEL.

Due to a severe winter and late spring the roads and trails within the park were not opened to the public until after June 10, and in high elevations until July 15. This prevented many early arrivals from enjoying the park. No count was taken of people entering the park prior to July 1, 1917. The aggregate number of persons entering the park during July, August, and September, 1917, was 70,417. During the entire season the estimated number of visitors to the park was 117,186. 13,807 automobiles and 70,417 visitors were actually counted, and a conservative estimate indicates that 9,197 automobiles and 46,769 visitors entered the park without actual count.

ROADS.

Within the park boundaries there are only 5 miles of road under absolute park jurisdiction:

Beaver Creek road.—This road begins at a point on the east line of section 24, township 5 north, range 74 west, sixth principal meridian, and extends thence northwesterly a distance of 1½ miles to a point in section 14, same township and range. This road is used only as a logging road for the removal of burned timber and by fishermen, and is in bad condition.

Mill Creek road.—This road begins at a point in section 6, township 4 north, range 73 west, sixth principal meridian, and extends thence to Mill Creek ranger station in section 1, township 4 north, range 74 west, sixth principal meridian, distance 1¼ miles. It is extensively used by parties going over Flattop trail to Grand Lake and side trips from said trail; also for hauling timber and wood from old burns. It should be placed in first-class condition for present use and to open up public camping ground sites.

Bear Lake-Sprague road.—Beginning at a point on the north line of section 8, township 4 north, range 73 west, sixth principal meridian, and extending thence southwesterly to a point in section 13, township 4 north, range 74 west, sixth principal meridian, distance 2¼ miles. This road is in good condition and is extensively used by parties going to Bear Lake, Loch Vale, Glacier Gorge, and Sprague. It should be extended to Bear Lake.

In addition to the above we have within the park boundaries approximately 50 miles of county roads, generally in very poor condition. Steps should be taken to have these roads placed under the control of the National Park Service as soon as adequate appropriations can be secured to place them in good serviceable condition.

Contracts have been let for the completion of additional sections of the Fall River road by the State of Colorado, one section on the western slope and one on the eastern slope of the Continental Divide. Contracts for connecting sections to complete the road will probably be awarded this fall, and it is expected that work will begin early in the spring of 1918. Little has been accomplished this year on account of the late season.

Eastern approach.—Roads from Fort Collins, Loveland, and Lyons, Colo., have been in poor condition this season, especially sections passing through Larimer County. During the early part of the season it was at times impossible to move freight from railroad terminals at Fort Collins, Loveland, and Lyons, Colo., to the park. Our supply of provisions and coal ran low, and building operations within the park were retarded.

Southern approach.—The travel over the South St. Vrain road via Boulder and Lyons, Colo., has increased 150 per cent this season, due to the condition of the road, which has been good, and to its scenic attractions.

Western approach.—This approach will not become popular until the Fall River road across Continental Divide is completed. Travel over this approach, however, has increased this season via Granby, Colo., and road conditions have been generally good.

TRAILS.

One mile of new trail has been built. This trail will ultimatley reach Lakes Nanita and Nakoni on the western slope. Owing to the small amount of money available, we could do no more than put the old trails in passable condition.

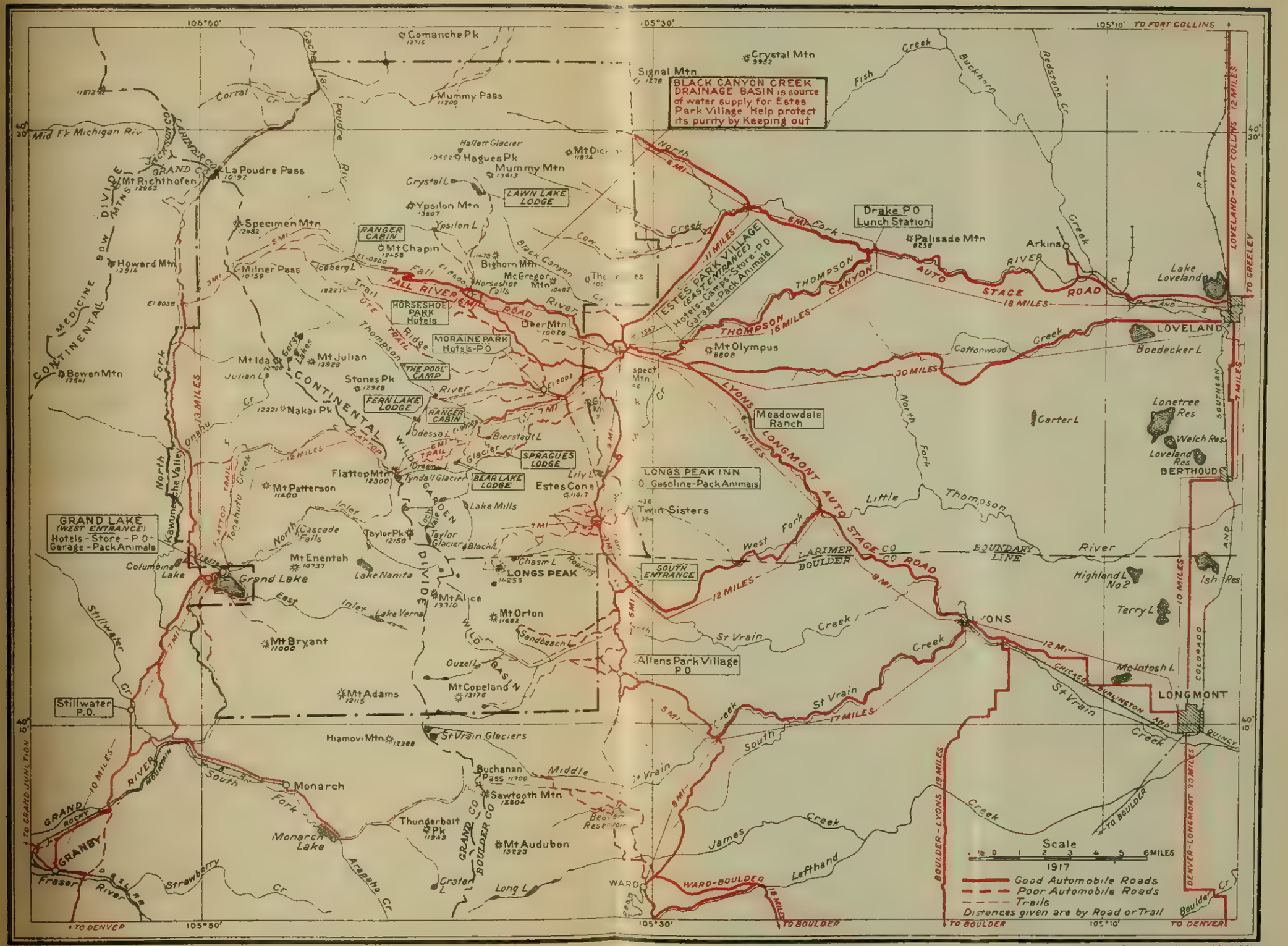
FISH.

Through a cooperative agreement with the Colorado State Game and Fish Commission we have secured from the Estes Park hatchery and planted in streams within the park 340,000 eastern brook trout. Two hundred thousand black-spotted trout will be available from this hatchery, and a shipment of 10,000 black-spotted trout will be received from the Federal Government hatchery at Leadville, Colo., about September 20. Both consignments will be placed in streams and lakes within the park. Fish generally have not risen to the fly as readily this season as last, but fair catches have been the rule.

WILD ANIMALS.

Due to the closed season in the State of Colorado, and to close supervision over the wild animals by park officials, very gratifying results have been obtained from a game-protection standpoint within the park. Unfortunately the Colorado Legislature has declared an open season for 1918. This is regrettable, since deer have become very tame, and during the winter range in the lower altitudes near the park boundaries.

Mountain sheep (bighorn).—Mountain sheep have increased wonderfully in number. The lamb crop this spring was reported to be the largest known here. The sheep have become surprisingly tame. Bands numbering as high as 192 animals have been approached to within 50 yards without causing them to scatter.



MAP OF ROCKY MOUNTAIN NATIONAL PARK

The ranger in charge this summer approached within 50 feet of two rams without their becoming frightened. Unfortunately, a few of the sheep are affected with scabies, and steps are being taken to eliminate the disease before the entire band becomes affected.

The fact that sheep can be approached in automobiles and seen in this way almost every day adds to their value within the park.

Deer.—Deer are also on the increase within the park, and are becoming remarkably tame. Herds numbering as high as 63 animals have been counted. They show little fear of human beings, and pictures are easily secured.

Elk.—In 1914, 25 elk were shipped in from Yellowstone National Park. Several died the first year, and others drifted from the park. The remnant of the original band, however, has now secured a good footing and is growing rapidly. Seven calves were counted this year, and the known herd now numbers 27 head.

Bear.—Bears are not numerous within the park. Three black, one brown with cub, and one silver-tip have been reported this season.

Predatory animals.—A start was made last winter to exterminate predatory animals, but, as a great amount of necessary improvement work had to be carried on by the ranger force, little was accomplished, the killing of five foxes and seven martens being the extent of this work. Two mountain lions were reported as having been seen within the park, but we were unsuccessful in our attempt to trap them. Two deer and one sheep have been reported killed by mountain lions. Much better results are expected from this work during the coming winter.

Birds.—Song and insectivorous birds, being protected from cats and the small boy with his rifle, are increasing, 175 different species being reported in the park for this season. An exceptional increase in ptarmigan is also apparent.

VIOLATIONS OF REGULATIONS.

Several minor violations of the park regulations have occurred this season, none, however, flagrant enough to make court action necessary. In all cases an amicable settlement was made, which resulted in hearty cooperation with the park authorities thereafter by the offending parties.

FOREST FIRES.

Five fire calls were responded to by the ranger force, three within the park and two on national forest lands adjacent to the park, none of which resulted in damage. Our new fire plan, introduced this season, has proven very effective, great credit being due to local people for cooperation, and especially to the Rocky Mountain Parks Transportation Co., the greatest amount of time required in any case being seven minutes to place at my disposal six men and an automobile for a fire which occurred in Beaver Creek Canyon. Their prompt response on this occasion prevented a disastrous fire.

IMPROVEMENTS.

Chief among our improvements this season is the construction of 18 miles of metallic circuit telephone line from the Mill Creek ranger station to Grand Lake, giving communication between district rangers and the park office. This work was done, mostly on snowshoes and skis, during the winter months.

Three new caches for fire tools, of log construction, large enough to afford shelter in case of emergency, have been completed, and work is progressing rapidly on others. This work is being done entirely by rangers. The new caches replace the board boxes now in use.

A new log shelter cabin with fireplace, located on the Cache la Poudre River, is about completed.

Residence for chief ranger in charge.—The size of this new structure is 24 by 30 feet, with a 10 by 12 foot addition and a 10 by 30 foot porch. This building has been occupied since May and is rapidly nearing completion.

WINTER SPORTS.

A winter sports carnival was held in February, 1917, which is, I believe, a new departure in national parks. The carnival was a decided success, 463 people participating in the sports, which consisted of snowshoeing, skiing, and tobogganing. The Colorado Mountain Club and the Estes Park Outdoor Club brought

out 85 members. While the members of these clubs are thoroughly familiar with the park under summer conditions, they are all agreed that winter conditions equal, if not surpass, those of the summer, both from a scenic as well as a recreative standpoint. Work is now under way to improve ski runs and toboggan slides at Fern Lake. Carnivals will be held yearly hereafter.

WOMEN NATURE GUIDES.

Another new attraction introduced this season is the nature guide. Young ladies who are well informed in matters relating to flowers, birds, animals, and trees, are available to teach nature lore to men, women, and children visiting the park. They have been highly successful and popular this season, and fill a long-felt want. They are required to pass an examination as to their qualifications as nature teachers and in first-aid work and knowledge of the country. Their operations (unless accompanied by a first-class guide) are limited to one-day trips below timber line, and to sections with which they are personally familiar.

ACCIDENTS.

I regret to report three serious accidents, one resulting fatally, within the park this season.

Mrs. Peter Hondius, of Estes Park, Colo., while participating in a toboggan race during the winter sports carnival in February, was thrown from a toboggan and sustained a broken leg.

On August 2 Miss Eula Frost, of Sterling, Colo., in company with Mr. Homer Thompson, of Estes Park, attempted to cross a large snowdrift near the Fall River road. Miss Frost lost her footing; and pulled Mr. Thompson down. Miss Frost slid a distance of approximately 500 feet, striking outcropping rocks, the bruises from which caused her death. Mr. Thompson missed the rocks but continued to slide another 500 feet to the lower edge of the drift, receiving several serious cuts and bruises, none of which proved fatal.

Several accidents occurred this season, due to collisions between automobiles and equestrians, resulting in minor cuts. In one case a horse's leg was broken.

SULLYS HILL NATIONAL PARK.

SAMUEL A. M. YOUNG, Acting Supervisor, Fort Totten, N. Dak.

GENERAL STATEMENT.

This reservation was set aside by Executive proclamation dated June 2, 1904, under act of Congress approved April 27, 1904 (33 Stat., 319), and contains about 780 acres. It is located on the south shore of Devils Lake, N. Dak., about 14 miles from the town of Devils Lake. The park is located about 1 mile northeast of the Fort Totten Indian School and has a shore line about 2 miles long, bordering on the lake. The park may be reached by wagon road from Devils Lake by way of Narrows or by launch from Chautauqua on the north.

IMPROVEMENTS.

In 1916 the park was inclosed, by the Biological Survey of the Department of Agriculture, with a substantial woven-wire fence, at a cost of $9,186. During the present summer a tract embracing 27½ acres at the west end of the park has been fenced off for a camping ground. This tract is immediately adjacent to Sweetwater Lake.

Within the smaller inclosure a 5-room frame cottage was built for the warden, at a cost of $1,557, and was completed July 1. There was also constructed a barn with room for three horses and one cow, also room for hay and grain, at a cost of $649. During the summer the park has been under the immediate direction of Mr. F. M. Dille, inspector of mammal and bird reservations.

WILD ANIMALS.

Last March, 15 head of elk were placed in the park. They were brought from the Yellowstone National Park. One of these soon died, leaving 14 elk in the park at the present time. In May, four whitetailed deer were brought from the Fargo Agricultural Experiment Station and placed in the park. One of these

also died, but the other three are doing well. It is planned in the near future to procure as an added attraction six head of bison from the Yellowstone National Park.

TRAVEL.

Up to date, the number of visitors have been approximately 87 in May, 340 in June, 820 in July, 760 in August, and 200 in September. The total number of visitors for the entire season was 2,207.

CASA GRANDE RUIN.

JAMES P. BATES, Custodian, Florence, Ariz.

GENERAL STATEMENT.

The ruin known by the Spanish name Casa Grande, "Great House," is situated near the left bank of the Gila River about 12 miles from the site of the present town of Florence, Ariz. It can be conveniently reached by carriage either from the town of Florence or from Casa Grande station on the Southern Pacific Railway. The route to the ruin via Florence is slightly shorter than that from Casa Grande station, enabling one to make the visit and return in a single day. There are a hotel and livery stables in both towns, but the visitor should provide for his own refreshment at the ruin.

This reservation was set aside by Executive order dated June 22, 1892, under the act approved March 2, 1889 (25 Stat., 961). By presidential proclamation of December 10, 1909, the boundaries of the reservation were changed by the elimination of 120 acres on which there were no prehistoric ruins and the inclusion of a tract of 120 acres adjoining the reservation on the east, on which are located important mounds of historic and scientific interest.

Casa Grande was a ruin when discovered and has not been permanently inhabited since it was first seen by a white man. The identity of its builders has furnished a constant theme for speculation from the discovery of the ruin to the present time. Although it has been ascribed to the Aztec, there is no evidence that the ancient people who inhabited this building were closely related to any tribes of the Mexican plateau, whose culture, as indicated by archaeologic remains, was different from that of the Pueblos, or sedentary tribes of New Mexico and Arizona. The age of Casa Grande and contiguous remains is unknown, but there is good reason to believe that settlements on their site were older than most of the present pueblos or cliff dwellings. The Pima claim, however, that it is not so old as ruins of the same general character situated near Phoenix, on Salt River, a short distance from its junction with the Gila.

During the year at request of the National Park Service the Commissioner of the General Land Office replaced, at expense of the annual appropriation for protecting the public lands, the roof on the custodian's house, which was blown off by a storm, and has improved a dug well sunk many years ago by installing over it a small engine and pump. The casing had decayed and fallen in, in large measure, and since the improvement was made the walls have again caved badly, so that the well is now in bad condition. It is recommended that a new well be drilled a short distance west of the present one to a depth of 80 to 100 feet, cased with 5-inch casing, and the engine and pump moved over to the new well. The cost is estimated at $450. The improvement is badly needed.

The reservation is considerably in need of fencing to protect the ruin from inroads of stray cattle. The cost, estimated last year at $800, is now anticipated to be not less than $1,500, the increase being attributable to rise in price of materials.

The reservation is situated 12 miles from the nearest town and there is no rural delivery route which passes near, so that the custodian is without regular mail service and is put to much inconvenience to obtain supplies. It is recommended that a small automobile be supplied, the expense of which would be considerably less than a team.

APPENDIX C.

STATISTICS.

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STATISTICS.

Visitors to parks, 1904 to 1917.

Name of park.	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917
Hot Springs Reservation	[2] 101,000	[2] 109,000	[1]	[1]	[1]	[1]	[2] 120,000	[2] 130,000	[2] 135,000	[2] 135,000	[2] 125,000	[2] 115,000	[2] 118,740	[2] 135,000
Yellowstone National Park	13,727	26,188	17,182	16,414	19,542	32,545	19,575	23,054	22,970	24,929	20,250	51,895	35,849	35,400
Casa Grande Ruin	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[2] 450	[2] 450	[2] 450	[2] 500	[2] 500	1,909	2,437
Sequoia National Park	[1]	[1]	[2] 700	[2] 900	1,251	854	2,407	3,114	2,923	3,823	4,667	7,647	10,780	18,510
Yosemite National Park	[1]	[1]	5,414	7,102	8,850	13,182	13,619	12,530	10,884	13,735	15,145	33,452	33,390	34,510
General Grant National Park	[2] 1,000	[2] 1,000	[2] 900	[2] 1,100	1,773	798	1,178	2,160	2,240	2,756	3,735	10,523	15,360	17,390
Mount Rainier National Park	563	928	1,786	2,068	2,826	5,968	8,000	10,306	8,946	13,501	15,038	35,166	23,989	35,568
Crater Lake National Park	[2] 1,500	[2] 1,400	[2] 1,800	[2] 2,600	5,275	4,171	[2] 5,000	[2] 4,500	5,235	6,253	7,096	11,371	12,265	11,645
Wind Cave National Park	[2] 2,900	2,438	2,787	2,751	3,171	3,216	3,387	3,887	3,199	3,988	3,592	2,817	[2] 9,000	16,742
Platt National Park	[1]	[1]	[1]	[2] 28,000	[2] 26,000	[2] 25,000	[2] 25,000	[2] 30,000	[2] 31,000	[2] 35,000	[2] 30,000	[2] 20,000	[2] 30,000	[2] 35,000
Sullys Hill Park	[1]	[1]	[1]	[2] 400	[2] 250	[2] 190	[2] 190	[2] 200	[2] 200	[2] 300	[2] 500	[2] 1,000	[2] 1,500	2,207
Mesa Verde National Park	.....	.....	[1]	[1]	[2] 80	165	250	206	230	280	502	663	1,385	2,223
Glacier National Park	.....	.....	.....	.....	.....	.....	.....	[2] 4,000	6,257	12,138	14,168	14,265	12,839	15,050
Rocky Mountain National Park	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[2] 31,000	[2] 51,000	[2] 117,186
Hawaii National Park	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]	[1]
Lassen Volcanic National Park	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]	[2] 8,500
Mount McKinley National Park	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]
Total	120,690	140,954	30,569	61,335	69,018	86,089	198,606	224,407	229,534	252,153	240,193	335,299	358,006	487,368

[1] No record.

[2] Estimated.

Automobile and motorcycle licenses issued during seasons of 1914, 1915, 1916, and 1917.

Name of park.[1]	1914		1915		1916		1917[2]	
	Automobiles.	Motorcycles.	Automobiles.	Motorcycles.	Automobiles.	Motorcycles.	Automobiles.	Motorcycles.
Yellowstone[3]	.....	.....	958	.....	3,430	.....	5,285	.....
Sequoia[4]	164	.....	343	11	731	4	923	.....
Yosemite	871	.....	3,901	.....	3,932	.....	5,000	.....
General Grant	409	12	1,604	40	1,730	41	2,091	.....
Mount Rainier	1,597	204	3,235	247	2,973	99	5,792	87
Crater Lake	1,117	18	2,015	31	2,051	29	1,766	15
Mesa Verde	30	4	86	.....	178	2	308	.....
Glacier	267	4	467	16	511	11	1,121	.....
Total	4,455	242	12,609	345	15,536	186	22,286	102

[1] No licenses required for Casa Grande Ruin, Wind Cave, Hot Springs, Platt, Hawaii, Lassen Volcanic, Sullys Hill, and Rocky Mountain National Parks. No roads in Mt. McKinley Park.
[2] Number of licenses formally reported to Washington, to and including Oct. 10, 1917.
[3] Opened to automobiles Aug. 1, 1915.
[4] License required only for Giant Forest road.
Licenses not required in certain parks because of small road mileage or unimproved condition of roads (see footnote 1). Licenses also not required for travel on unimproved roads in other parks. No license required for operating cars on official business.

Receipts collected from automobiles and motorcycles (single trip[1] and season permits) during seasons of 1914, 1915, 1916, and 1917.

Name of park.[2]	1914	1915	1916	1917[3]
Yellowstone[4]	.....	$7,076.57	$25,387.50	$39,637.50
Sequoia[5]	$817.61	1,183.56	1,600.00	2,307.50
Yosemite	4,033.45	13,457.71	19,885.00	25,000.00
General Grant	445.89	1,685.50	[6] 957.50	1,045.50
Mount Rainier	8,147.95	16,371.61	13,194.00	[7] 13,875.50
Crater Lake	1,167.00	2,102.00	4,402.00	4,433.00
Mesa Verde	38.52	85.07	95.50	154.00
Glacier	342.52	573.99	312.00	1,121.00
Total	14,992.94	42,536.11	65,833.50	87,574.00

[1] By regulation of May 1, 1917, single-trip license abolished and all permits made good for entire season.
[2] No license required for Casa Grande Ruin, Wind Cave, Hot Springs, Platt, Hawaii, Lassen Volcanic, Sullys Hill, and Rocky Mountain National Parks. No roads in Mt. McKinley Park.
[3] Received in Washington, to and including Oct. 10, 1917.
[4] Opened to automobiles Aug. 1, 1915.
[5] License required only for Giant Forest road.
[6] Automobile single-trip fee reduced by regulation, Mar. 1, 1916, from $1 to 50 cents, season permit from $5 to $2.50.
[7] Automobile single-trip and season permit fee reduced by regulation May 1, 1917, from $4 and $6, respectively, to $2.50.

Private automobiles entering parks during seasons of 1916 and 1917.

Name of park.	1916	1917[1]	Name of park.	1916	1917[1]
Yellowstone	3,445	5,703	Wind Cave[2]	[4] 2,500	4,837
Casa Grande Ruin[2]	[4] 470	604	Mesa Verde	185	364
Sequoia[3]	736	2,334	Glacier	902	1,121
Yosemite	4,043	6,521	Rocky Mountain[2]	[4] 10,050	[5] 23,004
General Grant	1,778	2,158			
Mount Rainier	3,070	5,894	Total	29,828	55,296
Crater Lake	2,649	2,756			

[1] Automobiles entering parks with or without licenses, to and including Oct. 12, 1917.
[2] No license required.
[3] License required only for Giant Forest road.
[4] Estimated.
[5] 13,807 actually counted from July 1 to Oct. 1, 9,197 conservative estimate of those not counted.

Statement of appropriations made for, and received revenues from, the various national parks, and expenditures made therefrom during the fiscal years 1904–1918, inclusive.

Name of the national park.	Appropriations.		Revenues.	
	Appropriated.	Expended.	Received.	Expended.
Hot Springs Reservation:				
1904	$36,050.00	(1)	$18,430.00	(1)
1905	8,000.00	(1)	19,330.00	(1)
1906	6,000.00	(1)	19,748.33	(1)
1907			20,165.00	$19,938.41
1908			28,090.00	21,115.56
1909			34,475.00	19,699.27
1910			36,540.00	28,401.97
1911	2,935.00	$2,935.00	36,060.00	56,375.33
			[2] 82,518.00	
1912			35,279.16	3,267.96
				[3] 42,957.18
1913			40,711.00	[4] 29,438.25
				[3] 34,581.57
			[5] 1,287.90	[6] 1,273.70
1914			38,380.00	[5] 36,658.62
1915			37,877.66	36,941.95
1916			37,926.32	40,261.14
1917			35,611.75	31,302.98
1918				
Yellowstone:				
1904	8,940.30	(1)		
1905	7,500.00	(1)		
1906	7,500.00	(1)	1,522.50	(1)
1907	7,500.00	7,498.64	1,838.96	3,647.04
1908	8,000.00	7,999.40	4,699.65	4,228.37
1909	[7] 8,000.00	7,997.44	4,790.20	3,661.47
	[8] 2,500.00	1,962.53		
1910	8,000.00	7,999.71	5,110.05	3,359.80
1911	8,500.00	8,499.96	23,420.13	7,998.47
1912	8,500.00	8,500.00	16,476.38	8,103.41
1913	8,500.00	8,500.00	21,980.10	6,449.97
1914	8,500.00	8,500.00	15,439.23	13,843.24
1915	8,500.00	8,500.00	20,307.40	12,884.18
1916	8,500.00	8,491.41	46,628.49	26,350.96
1917	8,500.00	8,500.00	54,795.69	53,775.61
1918	10,500.00			
Sequoia:				
1904	10,089.69	(1)		
1905	10,000.00	(1)		
1906	10,000.00	(1)		
1907	10,000.00	9,919.82	159.50	
1908	15,550.00	15,333.50	43.15	18.97
1909	15,550.00	15,373.96	46.57	
1910	15,550.00	15,514.19	121.78	
1911	15,550.00	15,543.34	255.65	31.25
1912	15,550.00	15,549.20	305.16	48.25
1913	15,550.00	15,549.52	353.85	70.81
1914	15,550.00	15,549.27	4,094.21	83.94
1915	15,550.00	15,549.65	1,975.03	3,498.23
1916	15,550.00	15,549.75	5,169.86	4,740.75
1917	22,300.00	15,605.28	10,326.60	415.04
	[9] 50,000.00	50,000.00		
1918	25,000.00			
Yosemite:				
1904	6,000.00	(1)		
1905	8,400.00	(1)		
1906	25,400.00	(1)	1,000.00	
1907	5,750.00	5,705.24	9,193.04	1,000.00
1908	30,000.00	29,508.58	14,390.06	7,131.37
1909	30,000.00	29,969.86	15,851.17	5,024.84
1910	30,000.00	29,983.82	21,373.18	34,486.09

[1] Figures not available.
[2] Proceeds from sale of Government lots (lot fund).
[3] Expenditure from lot fund.
[4] Includes $1,272.71 expended in making survey and preparation of plans, etc., for sewer system, city of Hot Springs.
[5] Includes 99 cents expended on account of survey sewer system.
[6] Contributed by city of Hot Springs on account of sewer system; $14.20 returned to city.
[7] Administration and protection.
[8] Marking unmonumented portions of park boundaries.
[9] For purchase of private holdings.

Statement of appropriations made for, and received revenues from, the various national parks, etc.—Continued.

Name of the national park.	Appropriations.		Revenues.	
	Appropriated.	Expended.	Received.	Expended.
Yosemite—Continued.				
1911	$62,000.00	$62,000.00	$35,765.48	$19,050.39
	[1] 12,000.00	[1] 11,646.37		
1912	50,000.00	49,999.68	23,855.77	35,970.68
1913	80,000.00	80,000.00	19,495.83	16,431.16
1914	125,000.00	124,798.49	23,406.14	9,903.58
1915	100,000.00	99,235.22	37,019.20	40,699.30
1916	75,000.00	74,996.88	49,878.42	52,961.53
1917	250,000.00	250,000.00	53,500.66	55,098.45
1918	235,000.00			
General Grant:				
1904	2,058.65	[2]		
1905	2,000.00	[2]		
1906	2,000.00	[2]		
1907	2,000.00	1,988.75		
1908	2,000.00	1,914.76	63.75	
1909	2,000.00	1,999.93		
1910	2,000.00	1,999.90	50.00	
1911	2,000.00	1,999.89	210.64	18.88
1912	2,000.00	1,998.60	173.54	.99
1913	2,000.00	1,999.20	158.68	503.01
1914	2,000.00	2,000.00	429.64	1.59
1915	2,000.00	2,000.00	560.89	355.68
1916	2,000.00	1,999.36	1,795.50	481.46
1917	2,000.00	2,000.00	1,153.78	536.97
1918	2,000.00			
Mount Rainier:				
1907	[3] 2,500.00	2,407.91	205.22	
1908	3,000.00	2,965.59	170.00	8.96
1909	3,000.00	2,961.61	1,104.79	27.65
1910	3,000.00	3,000.00	9,053.79	2,763.86
1911	3,000.00	2,998.90	7,748.48	5,342.47
1912	5,400.00	5,399.99	5,370.36	9,363.33
1913	20,000.00	19,989.70	7,301.62	6,791.80
1914	23,400.00	23,347.05	9,040.10	6,039.42
1915	51,000.00	50,907.79	12,893.29	5,513.46
1916	30,000.00	30,000.00	19,317.99	15,026.08
1917	30,000.00	30,000.00	14,346.80	17,617.04
1918	75,000.00			
Crater Lake:				
1904	2,000.00	[2]		
1905	3,000.00	[2]		
1906	3,000.00	[2]		
1907	3,000.00	2,989.75	10.00	[4]
1908	7,315.00	7,314.65		
1909	3,000.00	2,999.21	15.00	
1910	3,000.00	2,999.97	11.00	
1911	3,000.00	2,999.77	30.00	
1912	3,000.00	2,998.75	323.00	
1913	3,000.00	2,978.41	784.18	
1914	7,540.00	7,483.61	793.00	
1915	8,040.00	7,884.59	1,359.50	
1916	8,000.00	7,836.84	2,402.04	
1917	8,000.00	7,995.08	4,565.25	
1918	15,000.00			
Wind Cave:				
1904	[5] 2,500.00	[2]		
1905	2,500.00	[2]		
1906	2,500.00	[2]		
1907	4,400.00	4,398.08		
1908	2,500.00	2,433.54	200.00	
1909	2,500.00	2,335.37	450.00	220.80
1910	2,500.00	2,500.00	523.25	62.88
1911	2,500.00	2,413.60	340.00	562.26
1912	2,500.00	2,499.86	675.00	278.56
1913	375.00	132.50	528.26	1,197.39
1914	2,500.00	2,500.00	246.17	366.72
1915	2,500.00	2,496.97	2,342.90	606.16
1916	2,500.00	2,497.82	2,590.89	981.57
1917	2,500.00	2,499.87	1,632.60	1,013.04
1918	2,500.00			

[1] Appropriation, without year, for examination of water supply for city of San Francisco.
[2] Figures not available.
[3] No appropriation made for Mount Rainier prior to 1907.
[4] Expenditure of revenues of Crater Lake Park for park purposes therein not authorized by existing statutes enacted by Congress.
[5] No appropriation made for the Wind Cave National Park prior to 1904.

Statement of appropriations made for, and received revenues from, the various national parks, etc.—Continued.

Name of the national park.	Appropriations.		Revenues.	
	Appropriated.	Expended.	Received.	Expended.
Platt:				
1906	(1)		$37,307.44	
1907			178.00	$7,082.25
1908			7,021.00	10,552.26
1909			272.00	15,764.27
1910			164.50	11,734.74
1911	$5,000.00	$4,994.64	422.75	779.06
1912	10,000.00	9,999.34	165.50	219.84
1913	8,000.00	7,999.95	49.95	100.11
	[2] 17,500.00	[2] 10,120.73	[2] 17,500.00	[2] 10,119.06
1914	8,000.00	7,988.55	282.81	67.48
1915	8,000.00	8,000.00	241.76	178.87
1916 (deficiency, $10,000)	18,000.00	16,974.49	301.11	44.35
1917	8,000.00	8,000.00	434.11	138.28
1918	7,180.00			
Mesa Verde:				
1907–8	[3] 7,500.00	7,455.82		(4)
1909	7,500.00	7,348.33		
1910	7,500.00	7,443.09		
1910–11 (for examination of coal lands in park)	2,000.00	947.75		
1911	20,000.00	19,808.63	100.00	
1912	7,500.00	7,351.54	898.92	
1913	15,000.00	14,956.91	615.21	
1914	10,000.00	9,880.30	679.00	
1915	10,000.00	9,665,75	637.42	
1916	10,000.00	9,644.39	946.38	
1917	10,000.00	9,998.51	130.14	
1918	10,000.00			
Glacier:				
1911	[5] 15,000.00	14,998.59	326.88	
1912	69,200.00	69,117.94	1,490.94	
1913	75,000.00	74,568.24	4,677.14	428.84
1914	100,000.00	99,999.49	4,010.71	477.07
1915	75,000.00	74,994.27	4,218.51	9,735.44
1916	75,000.00	74,936.88	10,011.76	844.58
1917	110,000.00	109,279.52	3,202.40	1,352.75
1918	115,000.00			
Rocky Mountain:				
1915	[6] 3,000.00	2,910.80		(7)
1916	8,000.00	7,942.84	501.93	
1917	10,000.00	9,968.09	871.27	
1918	10,000.00			
Protection of national monument:				
1917	3,500.00	2,354.89		
1918	5,000.00			
Improvement of Mukuntuweap National Monument, Utah: 1917	15,000.00	14,997.14		
Improvement of Navajo National Monument, Ariz.:				
1917	3,000.00	1,962.69		

[1] No appropriation for Platt Park prior to 1911 fiscal year. Land prior to creation of park included in Sulphur Springs Reservation.

[2] Construction sanitary sewer, like amount being contributed by the city of Sulphur, Okla.; $7,380.94 returned to city.

[3] No appropriation made for the Mesa Verde National Park prior to 1907.

[4] Expenditure of revenues of Mesa Verde Park for park purposes therein not authorized by existing statutes enacted by Congress.

[5] No appropriation made for the Glacier National Park prior to 1911.

[6] No appropriation made for the Rocky Mountain National Park prior to 1915.

[7] Expenditure of revenues from Rocky Mountain Park not authorized by existing statutes for park purposes therein.

Summary of appropriations for the administration, protection, and improvement of the national parks for the fiscal years 1904–1918, inclusive.

1904	$67,638.64
1905	41,400.00
1906	56,400.00
1907	42,650.00
1908	68,365.00
1909	74,050.00
1910	73,550.00

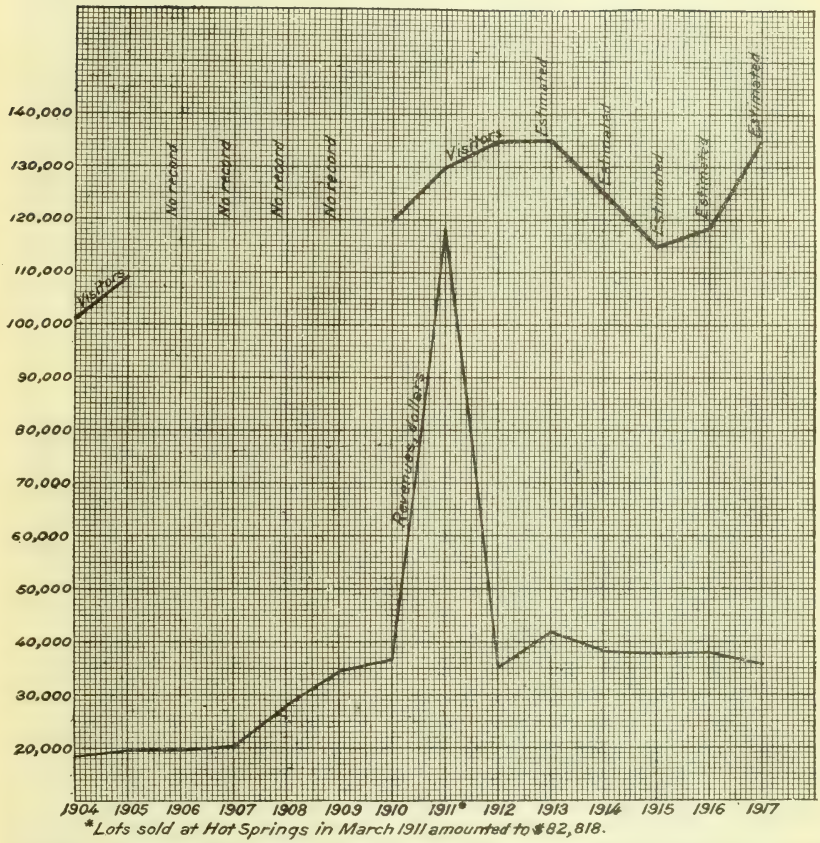
1911	$151,485.00
1912	173,650.00
1913	244,925.00
1914	302,490.00
1915	283,590.00
1916	252,550.00
1917	514,966.67
1918	524,780.00

Summary of appropriations for the various national monuments for the fiscal years 1906–1918, inclusive.

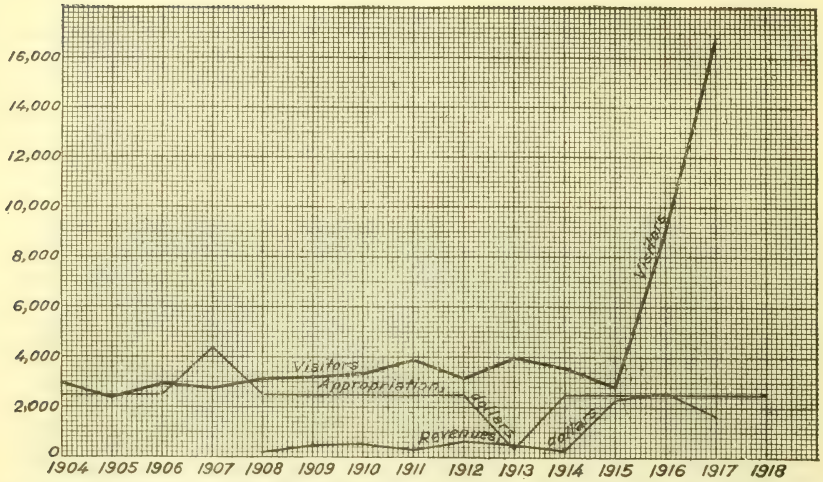
1906–1916	None.
1917	[1] $21,500.00
1918	5,000.00

[1] See detailed statement, p. 1003.

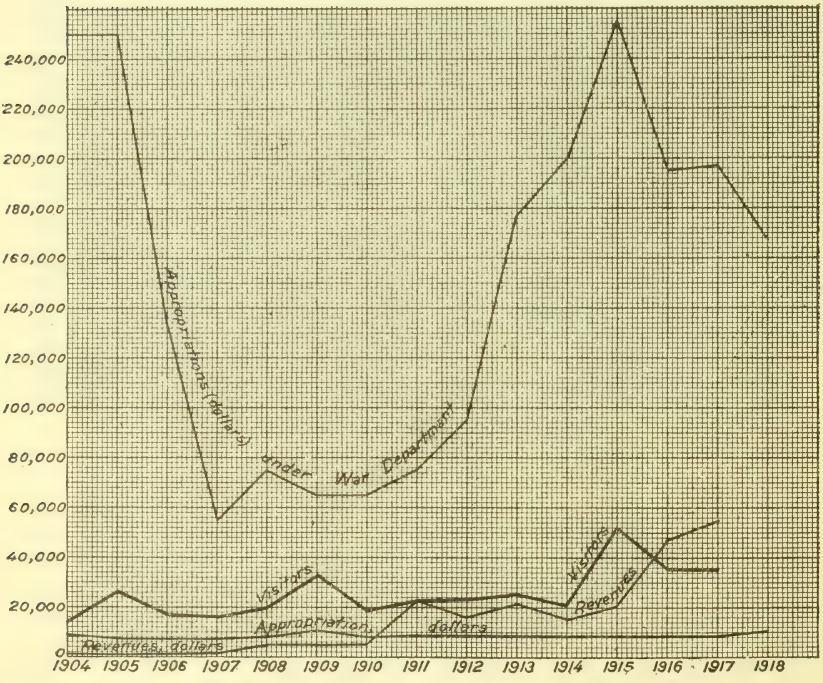
All national parks.—Total appropriations, revenues, and visitors.—Visitors by season, appropriations and revenues by fiscal years. Appropriations under War Department for road work in Crater Lake, Mount Rainier, and Yellowstone National Parks.



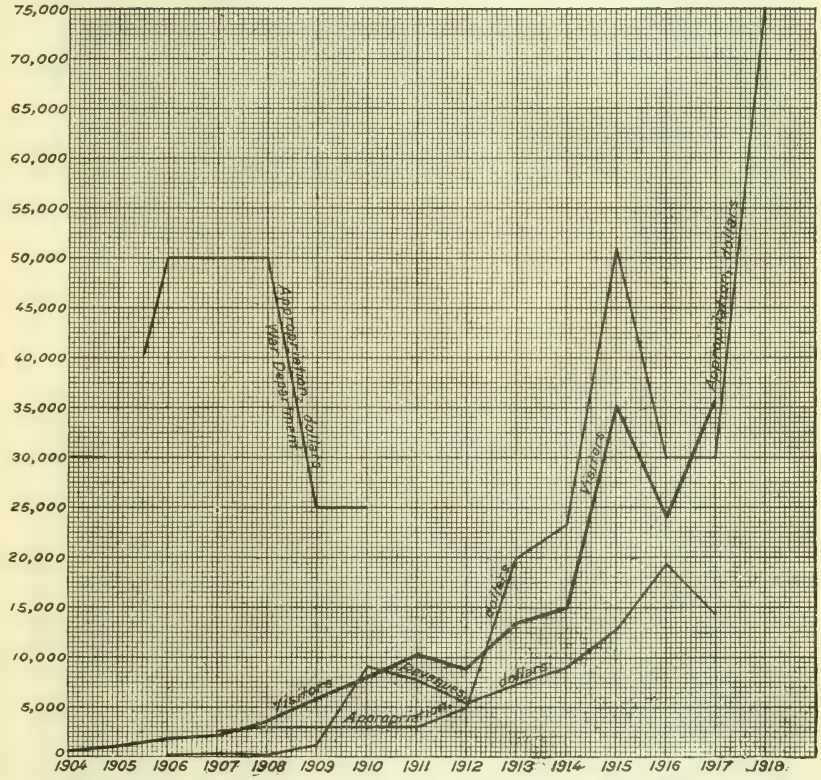
Hot Springs Reservation.—Revenues and visitors. Revenues by fiscal years and visitors by seasons.



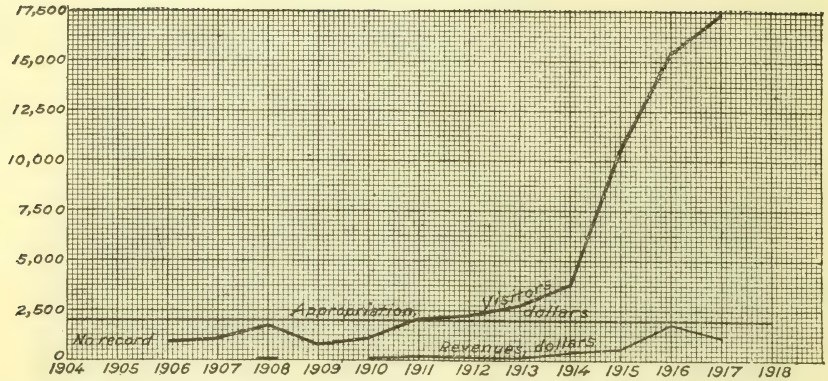
Wind Cave National Park.—Appropriations, revenues, and visitors. Visitors by season, appropriations and revenues by fiscal years.



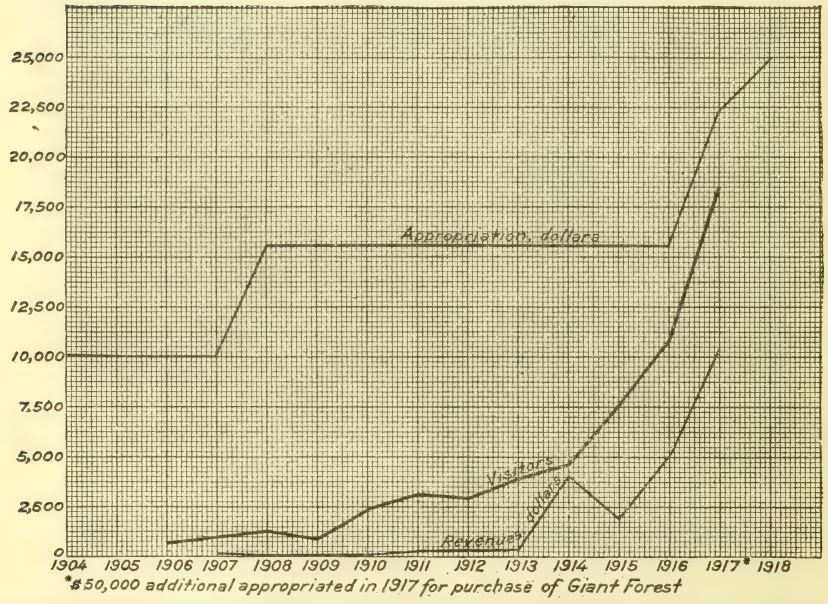
Yellowstone National Park.—Appropriations, revenues, and visitors. Visitors by season, appropriations and revenues by fiscal years. Appropriations under War Department for road work.



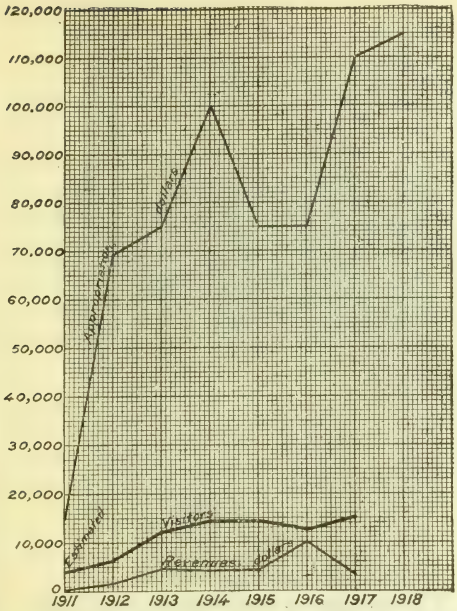
Mount Rainier National Park.—Appropriations, revenues, and visitors. Visitors by seasons, appropriations and revenues by fiscal years. Appropriations under War Department for road work.



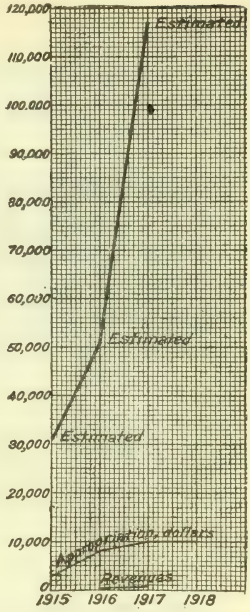
General Grant National Park.—Appropriations, revenues, and visitors. Visitors by seasons, appropriations and revenues by fiscal years.



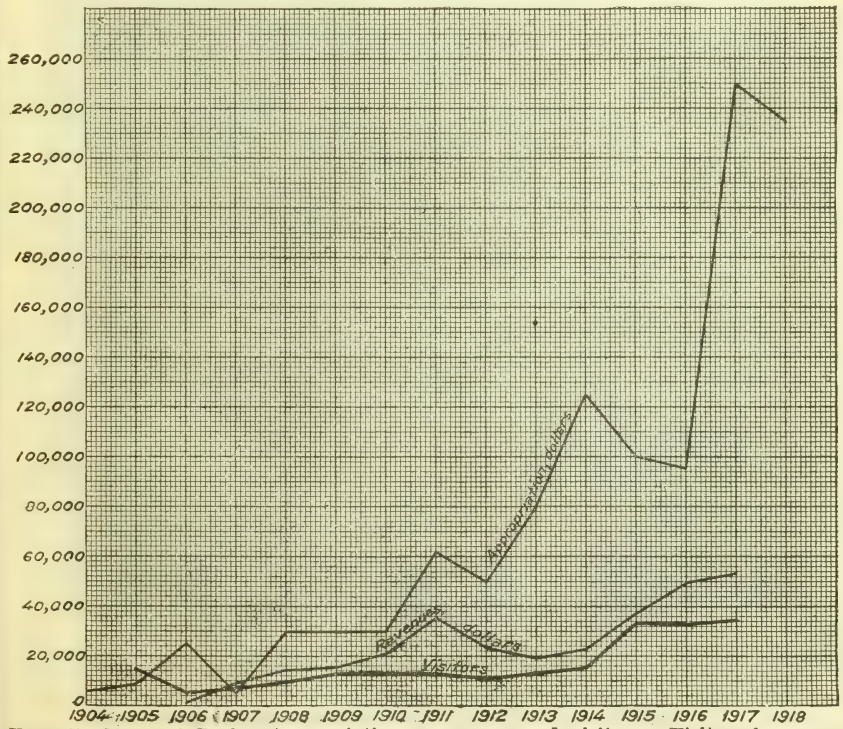
Sequoia National Park.—Appropriations, revenues, and visitors. Visitors by season, appropriations and revenues by fiscal years.



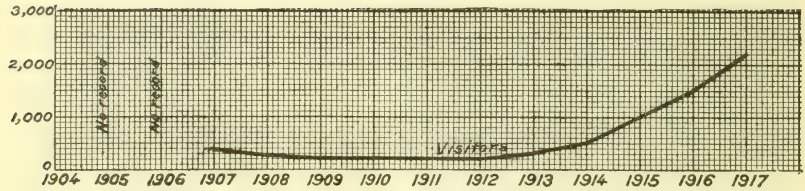
Glacier National Park.—Appropriations, revenues, and visitors. Visitors by season, appropriations and revenues by fiscal years.



Rocky Mountain National Park.— Appropriations, revenues, and visitors. Visitors by season, appropriations and revenues by fiscal years.



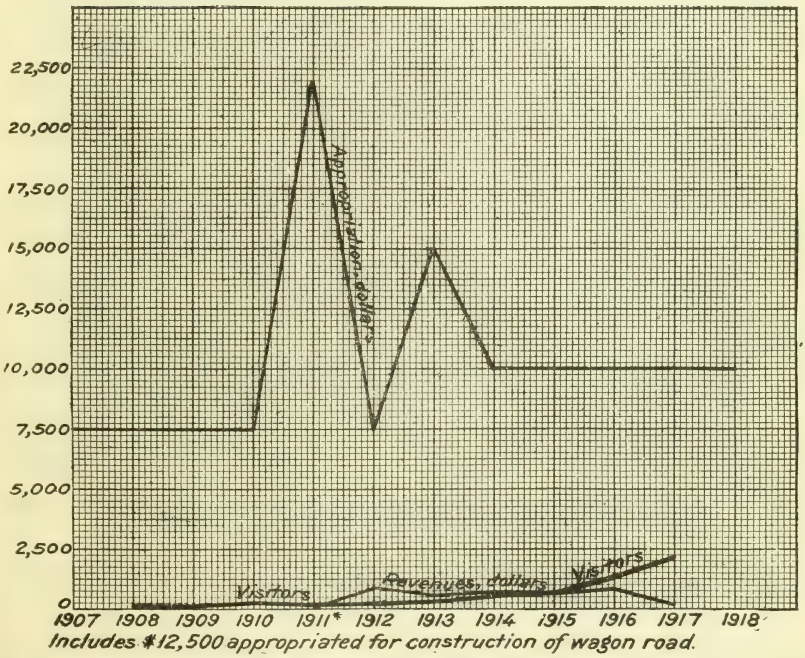
Yosemite National Park.—Appropriations, revenues, and visitors. Visitors by seasons, appropriations and revenues by fiscal years.



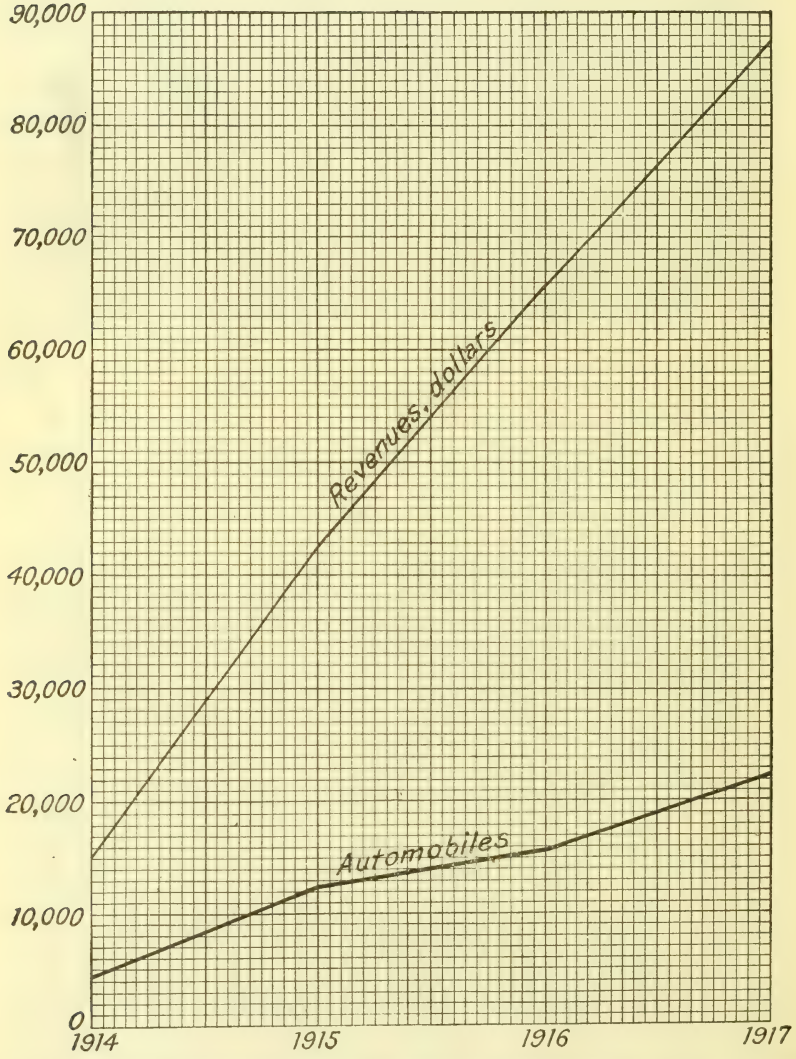
Sullys Hill Park.—Visitors by season.

Crater Lake National Park.—Appropriations, revenues, and visitors. Visitors by season, appropriations and revenues by fiscal years. Appropriations under War Department for road work.

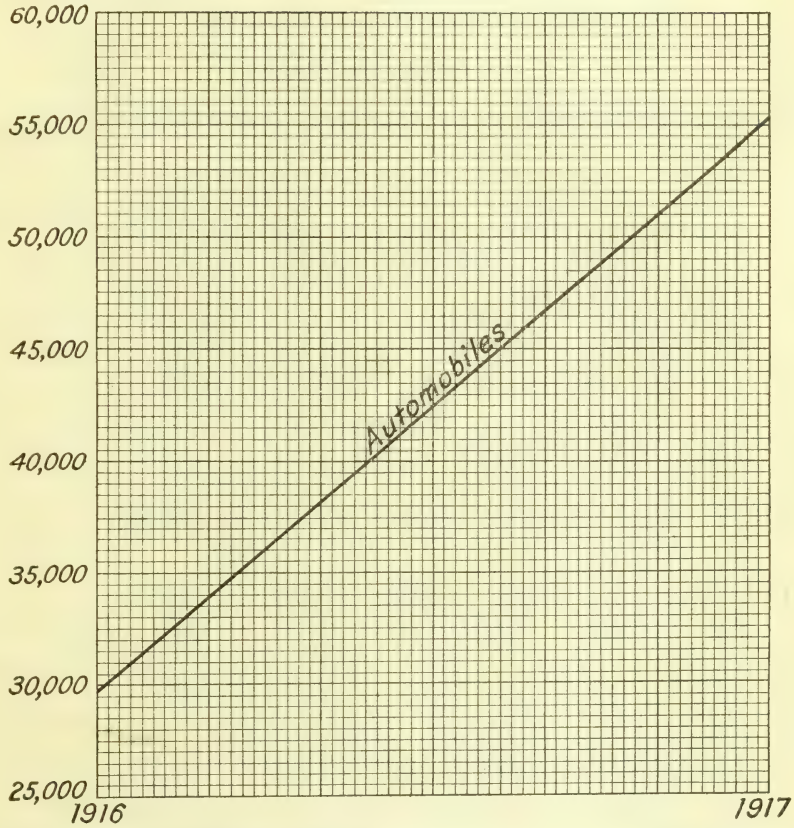
Platt National Park.—Appropriations, revenues, and visitors. Visitors by seasons, appropriations and revenues by fiscal years.



Mesa Verde National Park.—Appropriations, revenues, and visitors. Visitors by season, appropriations and revenues by fiscal years.



Totals of all private automobiles entering the national parks under permits and revenues derived from permit fees. See tables of statistics, page 973.



Totals of all private automobiles entering the national parks during the 1916 and 1917 seasons, with or without permits. See table of statistics, page 973.

DETAILED STATEMENT OF APPROPRIATIONS FOR NATIONAL PARKS AND NATIONAL MONUMENTS UNDER THE JURISDICTION OF THE SECRETARY OF THE INTERIOR, 1879–1918, INCLUSIVE.

NATIONAL PARK SERVICE.[1]

1917. National Park Service in the District of Columbia, deficiency act of Apr. 17, 1917 (Public No. 2, 65th Cong.)	$3,666.67
1918. National Park Service in the District of Columbia, sundry civil act of June 12, 1917 (Public No. 21, 65th Cong.)	17,600.00
Total	21,266.67

YELLOWSTONE NATIONAL PARK, WYO.[2]

UNDER INTERIOR DEPARTMENT.

[From Mar. 1, 1872, to June 20, 1878, no annual appropriations for the park were made by Congress. See below for some of the expenses for such period paid by later appropriation acts.]

1879. Protection and improvement of the park, sundry civil act of June 20, 1878 (20 Stats., 229)	$10,000.00
1880. Protection and improvement of the park, sundry civil act of Mar. 3, 1879 (20 Stats., 393)	10,000.00
1881. Protection and improvement of the park, sundry civil act of June 16, 1880 (21 Stats., 273)	15,000.00
1882. Protection and improvement of the park, sundry civil act of Mar. 3, 1881 (21 Stats., 451)	15,000.00
1880. For deficiency on account of protection and improvement, fiscal year 1880, deficiency act of Mar. 3, 1881 (21 Stats., 421)	89.76
1883. Protection and improvement of the park, sundry civil act of Aug. 7, 1882 (22 Stats., 329)	15,000.00
1879.[3] Protection and improvement of the park, deficiency act of Aug. 5, 1882 (22 Stats., 276)	150.00
1877–78. For salary and expenses of Supt. Norris from Apr. 18, 1877, to June 30, 1878, sundry civil act of Aug. 7, 1882 (22 Stats., 329)	3,180.41
1884. Protection and improvement, including salary of superintendent, $2,000, and 10 assistants at $900 each, sundry civil act of Mar. 3, 1883 (22 Stats., 626)	40,000.00
1885. Protection and improvement of the park, including salaries, sundry civil act of July 7, 1884 (23 Stats., 211)	40,000.00
1886. Protection and improvement of the park, including salaries sundry civil act of Mar. 3, 1885 (23 Stats., 499)	40,000.00
1886. Continuation of compensation, superintendent and employees, July 1 to 15, 1886, joint resolutions of July 1 and 15, 1886 (24 Stats., 343 and 345)	934.25
Reimbursement for expense of quarters of late Supt. Conger, deficiency act of Sept. 30, 1890 (26 Stats., 523)	169.37
1887. Protection and improvement of the park (construction of roads and bridges under direction engineer officer detailed by Secretary of War), sundry civil act of Aug. 4, 1886 (24 Stats., 240)	20,000.00
1894. For office of United States commissioner and jail, act of May 7, 1894, to protect birds and punish crimes in the park (28 Stats., 75)	5,000.00
1895. Reimbursement of United States commissioner the amount paid for completion office and jail buildings, sundry civil act of Mar. 2, 1895 (28 Stats., 945)	385.75

[1] Established by act of Aug. 25, 1916 (39 Stats., 535).
[2] Created by act of Mar. 1, 1872, secs. 2474 and 2475, Rev. Stats.
[3] And prior years.

1902. Repairs to United States commissioner's building, sundry civil act of Mar. 3, 1901 (31 Stats., 1162)	$450.00
1902.[1] Administration and protection, sundry civil act of Mar. 3, 1901 (31 Stats., 1169)	5,000.00
1902.[2] Surveying northern and western boundaries, sundry civil act of Mar. 3, 1901 (31 Stats., 1160)	3,300.00
1903.[2] Administration and protection, sundry civil act of June 28, 1902 (32 Stats., 456)	5,000.00
Completion survey of eastern boundary, sundry civil act of June 28, 1902 (32 Stats., 456)	2,800.00
For payment to E. F. Stahle for survey of western boundary, deficiency act of July 1, 1902 (32 Stats., 573)	13.99
For payment to E. F. Stahle for additional allowance for surveying boundary, deficiency act of July 1, 1902 (32 Stats., 573)	313.71
Purchase of buffalo and providing corral and feed, deficiency act of July 1, 1902 (32 Stats., 574)	15,000.00
Payment to the State of Wyoming for protection of park in prior years, act of May 27, 1902 (32 Stats., 236)	7,780.44
1904.[2] Administration and protection (including $2,500 for maintenance of buffalo), sundry civil act of Mar. 3, 1903 (32 Stats., 1119)	7,500.00
Surveying boundaries, deficiency act of Feb. 8, 1904 (33 Stats., 32)	1,440.30
1905.[2] Administration and protection (including $2,500 for maintenance of buffalo), sundry civil act of Apr. 28, 1904 (33 Stats., 487)	7,500.00
1906.[2] Administration and protection (including $2,500 for maintenance of buffalo), sundry civil act of Mar. 3, 1905 (33 Stats., 1188)	7,500.00
1907.[2] Administration and protection (including $2,500 for maintenance of buffalo), sundry civil act of June 30, 1906 (34 Stats., 729)	7,500.00
1908.[2] Administration and protection (including $2,500 for maintenance of buffalo, sundry civil act of Mar. 4, 1907 (34 Stats., 1337)	8,000.00
1909.[2] Administration and protection (including $2,500 for maintenance of buffalo, and $2,500 for surveying and marking unmonumented portions of park boundaries), sundry civil act of May 27, 1908 (35 Stats., 351)	10,500.00
1910.[2] Administration and protection (including $2,500 for maintenance of buffalo), sundry civil act of Mar. 4, 1909 (35 Stats., 990)	8,000.00
1911.[2] Administration and protection (including $3,000 for maintenance of buffalo), sundry civil act of June 25, 1910 (36 Stats., 745)	8,500.00
1912.[2] Administration and protection (including $3,000 for maintenance of buffalo), sundry civil act of Mar. 4, 1911 (36 Stats., 1420)	8,500.00
1913.[2] Administration and protection (including $3,000 for maintenance of buffalo), sundry civil act of Aug. 24, 1912 (37 Stats., 460)	8,500.00
1914. Administration and protection (including $3,000 for maintenance of buffalo), sundry civil act of June 23, 1913 (38 Stat., 49)	8,500.00
1915. Administration and protection (including $3,000 for maintenance of buffalo), sundry civil act of Aug. 1, 1914 (38 Stats., 648)	8,500.00
1916. Administration and protection (including $3,000 for maintenance of buffalo), sundry civil act of Mar. 3, 1915 (38 Stats., 862)	8,500.00

[1] Protection and improvement appropriations for the years 1888 to 1901, inclusive, were expended by the War Department.
[2] Improvement appropriations of these years were expendable by the War Department.

1917. Administration and protection (including $3,000 for maintenance of buffalo), sundry civil act of July 1, 1916 (39 Stats., 307)	$8,500.00
1918. Administration and protection (including $5,000 for maintenance of buffalo), sundry civil act of June 12, 1917 (Public No. 21, 65th Congress)	10,500.00
Total	382,507.98

UNDER WAR DEPARTMENT.

1888. Protection and improvement, sundry civil act of Mar. 3, 1887 (24 Stats., 531)	20,000.00
1889. Protection and improvement of park, sundry civil act of Oct. 2, 1888 (25 Stats., 534)	25,000.00
1890. Protection and improvement, sundry civil act of Mar. 2, 1889 (25 Stats., 967)	50,000.00
1891. Protection and improvement, sundry civil act of Aug. 30, 1890 (26 Stats., 398)	75,000.00
1892. Improvement of the park, sundry civil act of Mar. 3, 1891 (26 Stats., 977)	75,000.00
1893. Improvement of the park, sundry civil act of Aug. 5, 1892 (27 Stats., 376)	45,000.00
1894. Improvement of the park, sundry civil act of Mar. 3, 1893 (27 Stats., 598)	30,000.00
1895. Improvement of the park, sundry civil act of Aug. 18, 1894 (28 Stats., 403)	30,000.00
1896. Improvement and protection of the park, sundry civil act of Mar. 2, 1895 (28 Stats., 945)	30,000.00
1897. Improvement and protection, sundry civil act of June 11, 1896 (29 Stats., 442)	35,000.00
Improvement and protection, sundry civil act of June 4, 1898 (30 Stats., 43)	35,000.00
1898. Improvements, deficiency act of June 8, 1896 (29 Stats., 284)	5,000.00
Improvement of the park, deficiency act of July 19, 1897 (30 Stats., 143)	.78
1899. Improvement and protection, sundry civil act of July 1, 1898 (30 Stats., 629)	40,000.00
Improvements, deficiency act of July 7, 1898 (30 Stats., 667)	93.75
1900. Improvement and protection, sundry civil act of Mar. 3, 1899 (30 Stats., 1105)	40,000.00
Improvement of the park, deficiency act of Mar. 3, 1899 (30 Stats., 1226)	99.80
1901. Improvement and protection, sundry civil act of June 6, 1900 (31 Stats., 624)	60,000.00
Improvement, deficiency act of June 6, 1900 (31 Stats., 291)	6.95
Improvement for 1898, deficiency act of June 6, 1900 (31 Stats., 291)	162.62
1902. Improvement of the park, sundry civil act of Mar. 3, 1891 (31 Stats., 1169)	113,000.00
1903. Improvement of the park, sundry civil act of June 28, 1902 (32 Stats., 466)	250,000.00
Payment to Northern Pacific R. R. Co. for transportation of cast-iron pipe, deficiency act of Feb. 14, 1902 (32 Stats., 12)	31.96
1904. Improvement of the park, sundry civil act of Mar. 3, 1903 (32 Stats., 1130)	250,000.00
1905. Improvement of the park, sundry civil act of Apr. 28, 1904 (33 Stats., 498)	250,000.00
1906. Improvement of the park, sundry civil act of Mar. 3, 1905 (33 Stats., 1198)	133,000.00
1907. Maintenance and repair of improvements in park, sundry civil act of June 30, 1906 (34 Stats., 743)	55,000.00
1908. Maintenance and repair of improvements in park, sundry civil act of Mar. 4, 1907 (34 Stats., 1349)	75,000.00
1909. Maintenance and repair of improvements in park, sundry civil act of May 27, 1908 (35 Stats., 365)	65,000.00

1910. Maintenance and repair of improvements in park, sundry civil act of Mar. 4, 1909 (35 Stats., 1005)	$65,000.00
1911. Maintenance and repair of improvements in park, sundry civil act of June 25, 1910 (36 Stats., 725)	75,000.00
1912. Maintenance and repair of improvements in park, sundry civil act of Mar. 4, 1911 (36 Stats., 1402)	70,000.00
Construction of chapel in park on or near military reservation Army appropriation act of Mar. 3, 1911 (36 Stats., 1050)	25,000.00
1913. Maintenance and repair of improvements in park, sundry civil act of Aug. 24, 1912 (37 Stats., 442)	100,000.00
Widening and improving surface of roads, for building bridges and culverts to make roads suitable and safe for animal-drawn and motor-propelled vehicles, sundry civil act of Aug. 24, 1912 (37 Stats., 442)	77,000.00
1914. Maintenance and repair of improvements in park, sundry civil act of June 23, 1913	125,000.00
Widening and improving surface of roads, for building bridges and culverts to make roads suitable and safe for animal-drawn and motor-propelled vehicles, sundry civil act of June 23, 1913 (38 Stats., 33)	75,000.00
1915. Maintenance and repair of improvements, sundry civil act of Aug. 1, 1914 (38 Stats., 632)	125,000.00
Widening to not exceeding 18 feet, and improving surface of roads, and for building bridges and culverts in the park to make such roads suitable and safe for animal-drawn and motor-propelled vehicles, sundry civil act of Aug. 1, 1914 (38 Stats., 632)	100,000.00
Widening to not exceeding 18 feet and improving the surface of roads and for building bridges and culverts *in the forest reserve* leading out of the park from the east boundary to make such roads suitable and safe for animal-drawn and motor-propelled vehicles, sundry civil act of Aug. 1, 1914 (38 Stats., 633)	30,000.00
1916. Maintenance and repair of improvements, sundry civil act of Mar. 3, 1915 (38 Stats., 845)	125,000.00
Widening and improving surface of roads, for building bridges and culverts to make such roads suitable and safe for animal-drawn and motor-propelled vehicles, sundry civil act of Mar. 3, 1915 (38 Stats., 845)	50,000.00
Completing the widening to not exceeding 18 feet of roadway and improving the surface of roads and for building bridges and culverts *in the forest reserve* leading out of the park from the east boundary, to make such roads suitable and safe for animal-drawn and motor-propelled vehicles, sundry civil act of Mar. 3, 1915 (38 Stats., 845)	20,000.00
1917. Maintenance and repair of improvements, sundry civil act of July 1, 1916 (39 Stats., 288)	152,500.00
For completing the widening to not exceeding 18 feet of roadway and improving the surface of roads and for building bridges and culverts *in the forest reserve* leading out of the park from the east boundary, sundry civil act of July 1, 1916 (39 Stats., 289)	6,000.00
Widening and improving surface of roads, for building bridges and culverts to make such roads suitable and safe for animal-drawn and motor-propelled vehicles, sundry civil act of July 1, 1916 (39 Stats., 289)	38,700.00
1918. For maintenance and repair of improvements, sundry civil act of June 12, 1917 (Public No. 21, 65th Cong.)	147,500.00
For resurfacing and for finishing the belt line with oil macadam, sundry civil act of June 12, 1917 (Public No. 21, 65th Cong.)	20,000.00
Total	3,213,095.86

RECAPITULATION.

Appropriations under the Interior Department, 1879 to 1918, inclusive	$382,507.98
Appropriations under the War Department, 1888 to 1918, inclusive	3,213,095.86
Total	3,595,303.84

YOSEMITE NATIONAL PARK, CAL.[1]

[From Oct. 1, 1890, to July 1, 1898, no appropriations for the park were made by Congress.]

1899. For improvement, sundry civil act of July 1, 1898 (30 Stats., 624)	$4,000.00
1900. For improvement, sundry civil act of Mar. 3, 1899 (30 Stats., 1100)	4,000.00
1901. Protection and improvement, sundry civil act of June 6, 1900 (31 Stats., 618)	4,000.00
1902. Protection and improvement, sundry civil act of Mar. 3, 1901 (31 Stats., 1162)	4,000.00
1903. Protection and improvement, sundry civil act of June 28, 1902 (32 Stats., 456)	6,000.00
Payment of expenses incurred by officer detailed from Sequoia Park to Yosemite Park for investigation, deficiency act of Mar. 3, 1903 (32 Stats., 1060)	49.25
1904. Protection and improvement, sundry civil act of Mar. 3, 1903 (32 Stats., 1119)	6,000.00
1905. Protection and improvement, sundry civil act of Apr. 28, 1904 (33 Stats., 487)	5,400.00
Yosemite Park Lands Commission, for examination of conditions, etc., to ascertain what parts not necessary for park purposes, and determine course proposed road to Yosemite Valley, sundry civil act of Apr. 28, 1904 (33 Stats., 487)	3,000.00
1906. Protection and improvement, sundry civil act of Mar. 3, 1905 (33 Stats., 1188)	5,400.00
Management, protection, and improvement, joint resolution of Mar. 3, 1905 (33 Stats., 1286)	20,000.00
1907. Protection and improvement, sundry civil act of June 30, 1906 (34 Stats., 729)	5,750.00
1908. Protection and improvement, sundry civil act of Mar. 4, 1907 (34 Stats., 1337)	30,000.00
1909. Protection and improvement, sundry civil act of May 27, 1908 (35 Stats., 351)	30,000.00
1910. Protection and improvement, sundry civil act of Mar. 4, 1909 (35 Stats., 990)	30,000.00
1911. Protection and improvement (inclusive of $12,000 reserved within appropriation for road sprinkling), sundry civil act of June 25, 1910 (36 Stats., 745)	62,000.00
1912. Protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, sundry civil act of Mar. 4, 1911 (36 Stats., 1420)	50,000.00
1913. Protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, sundry civil act of Aug. 24, 1912 (37 Stats., 460)	80,000.00
1914. Protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, sundry civil act of June 23, 1913 (38 Stats., 49)	125,000.00

[1] Created by act of Oct. 1, 1890 (26 Stats., 650); boundaries changed by act of Feb. 7, 1905 (33 Stats., 702), and joint resolution of June 11, 1906 (34 Stats., 831), the latter accepting recession of Yosemite Valley from the State of California.

1915. Protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, sundry civil act of Aug. 1, 1914 (38 Stats., 649)	$100,000.00
1916. Protection and improvement, construction and repair of bridges, fences and trails, and improvement of roads other than toll roads, including not exceeding $2,700 for maintenance and repair of horse-drawn passenger-carrying vehicles for use of superintendent, supervisor, resident engineer, and employees in connection with general park work, sundry civil act of Mar. 3, 1915 (38 Stats., 863)	75,000.00
To cover claim of Crane Co. for water system supplies as reported in House Document 1579, Sixty-third Congress, third session, deficiency act of Mar. 4, 1915 (38 Stats., 1157)	196.80
1917. Protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, including not exceeding $500 for maintenance and repair of horse-drawn passenger-carrying vehicles for use of supervisor and employees in connection with general park work, not exceeding $1,000 for a motor-driven passenger-carrying vehicle for the use of supervisor and the maintenance, operation, and repair thereof, not exceeding $75,000 for grading in width not exceeding 20 feet El Portal-Yosemite road, and not exceeding $150,000 for installation of a hydroelectric power plant, sundry civil act of July 1, 1916 (39 Stats., 308)	250,000.00
1918. For protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, including not exceeding $800 for maintenance and repair of horse-drawn and motor-driven passenger-carrying vehicles for use of the supervisor and employees in connection with general park work, not exceeding $8,000 for a bridge at the old Sentinel Bridge site, and not exceeding $75,000 for grading in width not exceeding 20 feet El Portal-Yosemite road; also not exceeding $60,000 for the completion of the installation of the hydroeletcric power plant authorized by the sundry civil act for the fiscal year 1917, sundry civil act of June 12, 1917 (Public, No. 21, 65th Cong.); in all	235,000.00
Total	1,134,796.05

GLACIER NATIONAL PARK, MONT.[1]

1911. For improvement of Glacier National Park, the construction and repair of roads and trails, sundry civil act of June 25, 1910 (36 Stats., 745)	$15,000.00
1912. For administration and improvement, construction of roads, bridges, telephone lines, and repair of roads, trails, and bridges (appropriation made immediately available), sundry civil act of Mar. 4, 1911 (36 Stats., 1421)	69,200.00
1913. For administration and improvement, construction of roads, bridges, telephone lines, and repair of roads, trails, and bridges, sundry civil act of Aug. 24, 1912 (37 Stats., 460)	75,000.00
1914. For administration and improvement, construction and repair of roads, bridges, and telephone lines, sundry civil act of June 23, 1913 (38 Stats., 49)	100,000.00
1915. For administration and improvement, construction and repair of roads, trails, bridges, and telephone lines, sundry civil act of Aug. 1, 1914 (38 Stats., 648–649)	75,000.00
1916. For administration and improvement, construction and repair of roads, trails, bridges, and telephone lines, sundry civil act of Mar. 3, 1915 (38 Stats., 862–863)	75,000.00

[1] Created by act of Congress approved May 11, 1910 (36 Stats., 354).

1917.	For administration and improvement, construction and repair of roads, trails, bridges, and telephone lines, including $500 for construction of warehouse, and $10,000 reimbursement to Great Northern Railway Co. for repair of 32 miles of roads in the Blackfeet Indian Reservation, sundry civil act of July 1, 1916 (39 Stats., 307–308)	$110,000.00
1918.	For administration and improvement, construction and repair of roads, trails, bridges, and telephone lines, including necessary repairs to the roads from Glacier Park station through the Blackfeet Indian Reservation to various points in the boundary line of the park, and for the purchase and maintenance of horse-drawn and motor-driven passenger-carrying vehicles for the use of the supervisor and employees in connection with general park work, sundry civil act of June 12, 1917 (Public, No. 21, 65th Cong.)	115,000.00
	Total	634,200.00

SEQUOIA NATIONAL PARK, CAL.[1]

[From Sept. 25, 1890, to June 6, 1900, no appropriations for the park were made by Congress.]

1901.	Protection and improvement, sundry civil act of June 6, 1900 (31 Stats., 618)	$10,000.00
1902.	Protection and improvement, sundry civil act of Mar. 3, 1901 (31 Stats., 1162)	10,000.00
1903.	Protection and improvement, sundry civil act of June 28, 1902 (32 Stats., 456)	10,000.00
1904.	Protection and improvement, sundry civil act of Mar. 3, 1903 (32 Stats., 1119)	10,000.00
	Protection and improvement, deficiency act of Mar. 3, 1903 (32 Stats., 1060)	89.69
1905.	Protection and improvement, sundry civil act of Apr. 28, 1904 (33 Stats., 487)	10,000.00
1906.	Protection and improvement, sundry civil act of Mar. 3, 1905 (33 Stats., 1188)	10,000.00
1907.	Protection and improvement, sundry civil act of June 30, 1906 (34 Stats., 729)	10,000.00
1908.	Protection and improvement, sundry civil act of Mar. 4, 1907 (34 Stats., 1337)	15,550.00
1909.	Protection and improvement, sundry civil act of May 27, 1908 (35 Stats., 351)	15,550.00
1910.	Protection and improvement, sundry civil act of Mar. 4, 1909 (35 Stats., 990)	15,550.00
1911.	Protection and improvement, sundry civil act of June 25, 1910 (36 Stats., 745)	15,550.00
1912.	Protection and improvement, construction and repair of bridges, fences, and trails, sundry civil act of Mar. 4, 1911 (36 Stats., 1421)	15,550.00
1913.	Protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, sundry civil act of Aug. 24, 1912 (37 Stats., 460)	15,550.00
1914.	Protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, sundry civil act of June 23, 1913 (38 Stats., 49)	15,550.00
1915.	Protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, including the purchase of site for ranger station not to exceed $500, sundry civil act of Aug. 1, 1914 (38 Stats., 649)	15,550.00

[1] Created by acts of Sept. 25, 1890 (26 Stats., 478), and Oct. 1, 1890 (26 Stats., 650).

1916. Protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, including the purchase of site for ranger station not to exceed $500, sundry civil act of Mar. 3, 1915 (38 Stats., 863)	$15,550.00
1917. Protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, sundry civil act of July 1, 1916 (39 Stats., 308)	22,300.00
Purchase of lands in Sequoia National Park, sundry civil act of July 1, 1916 (39 Stats., 308)	50,000.00
1918. For protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, sundry civil act of June 12, 1917 (Public No. 21, 65th Cong.)	25,000.00
Total	307,339.69

GENERAL GRANT NATIONAL PARK, CAL.[1]

[From Oct. 1, 1890, to June 6, 1900, no appropriations for the park were made by Congress.]

1901. Improvement of park, sundry civil act of June 6, 1900 (31 Stats., 618)	$2,500.00
1902. Protection and improvement, sundry civil act of Mar. 3, 1901 (31 Stats., 1162)	2,500.00
1903. Protection and improvement, sundry civil act of June 28, 1902 (32 Stats., 456)	2,500.00
1904. Protection and improvement, sundry civil act of Mar. 3, 1903 (32 Stats., 1119)	2,000.00
For improvement of park in 1901, deficiency act of Mar. 3, 1903 (32 Stats., 1060)	58.65
1905. Protection and improvement, sundry civil act of Apr. 28, 1904 (33 Stats., 487)	2,000.00
1906. Protection and improvement, sundry civil act of Mar. 3, 1905 (33 Stats., 1188)	2,000.00
1907. Protection and improvement, sundry civil act of June 30, 1906 (34 Stats., 729)	2,000.00
1908. Protection and improvement, sundry civil act of Mar. 4, 1907 (34 Stats., 1337)	2,000.00
1909. Protection and improvement, sundry civil act of May 27, 1908 (35 Stats., 351)	2,000.00
1910. Protection and improvement, sundry civil act of Mar. 4, 1909 (35 Stats., 990)	2,000.00
1911. Protection and improvement, sundry civil act of June 25, 1910 (36 Stats., 745)	2,000.00
1912. Protection and improvement, sundry civil act of Mar. 4, 1911 (36 Stats., 1421)	2,000.00
1913. Protection and improvement, construction of fences and trails, and repairing and extension of roads, sundry civil act of Aug. 24, 1912 (37 Stats., 460)	2,000.00
1914. Protection and improvement, construction of fences and trails, and repairing and extension of roads, sundry civil act of June 23, 1913 (38 Stats., 49)	2,000.00
1915. Protection and improvement, construction of fences and trails, and repairing and extension of roads, sundry civil act of Aug. 1, 1914 (38 Stats., 649)	2,000.00
1916. Protection and improvement, construction of fences and trails, and repairing and extension of roads, sundry civil act of Mar. 3, 1915 (38 Stats., 863)	2,000.00
1917. Protection and improvement, construction of fences and trails, and repairing and extension of roads, sundry civil act of July 1, 1916 (39 Stats., 308)	2,000.00
1918. For protection and improvement, construction of fences and trails, and repairing and extension of roads, sundry civil act of June 12, 1917 (Public No. 21, 65th Congress)	2,000.00
Total	37,558.65

[1] Created by act of Oct. 1, 1890 (26 Stats., 650).

MOUNT RAINIER NATIONAL PARK, WASH.[1]

UNDER INTERIOR DEPARTMENT.

[From Mar. 2. 1899, to June 30, 1906, no appropriations for the park were made by Congress.]

1907. Protection and improvement, sundry civil act of June 30, 1906 (34 Stats., 729)	$2,500.00
1908. Protection and improvement, sundry civil act of Mar. 4, 1907 (34 Stats., 1337)	3,000.00
1909. Protection and improvement, sundry civil act of May 27, 1908 (35 Stats., 351)	3,000.00
1910. Protection and improvement, sundry civil act of Mar. 4, 1909 (35 Stats., 991)	3,000.00
1911. Protection and improvement, sundry civil act of June 25, 1910 (36 Stats., 745)	3,000.00
1912. Protection and improvement, construction of bridges, fences, and trails, etc., sundry civil act of Mar. 4, 1911 (36 Stats., 1421)	[2] 5,000.00
1913. Protection and improvement, construction of bridges, fences, and trails, and improvement of roads, sundry civil act of Aug. 24, 1912 (37 Stats., 460)	20,000.00
1914. Protection and improvement, construction of bridges, fences, and trails, and improvement of roads, sundry civil act of June 23, 1913 (38 Stats., 50)	13,400.00
For survey for the extension of the present road from a point at or about Longmire Springs eastward to the eastern boundary line of the forest reserve surrounding the park and for survey of necessary trails, sundry civil act of June 23, 1913 (38 Stats., 50)	10,000.00
1915. Protection and improvement, construction of bridges, fences, and trails, and improvement of roads, sundry civil act of Aug. 1, 1914 (38 Stats., 649)	51,000.00
1916. Protection and improvement, construction of bridges, fences, and trails, and improvement of roads, sundry civil act of Mar. 3, 1915 (38 Stats., 863)	30,000.00
1917. Protection and improvement, construction of bridges, fences, and trails, and improvement of roads, sundry civil act of July 1, 1916 (39 Stats., 308)	30,000.00
1918. Protection and improvement, construction of roads, bridges, fences, and trails, and improvement of roads, including not exceeding $1,250 for the purchase of a motor-driven vehicle and the maintenance and repair thereof, sundry civil act of June 12, 1917 (Public No. 21, 65th Congress)	75,000.00
Total	248,900.00

UNDER WAR DEPARTMENT.

1903. Survey of most practicable route for wagon road into park and toward construction of said road after survey shall have been made, deficiency act of Mar. 3, 1903 (32 Stats., 1131)	10,000.00
1904. Continuing construction wagon road, sundry civil act of Apr. 28, 1904 (33 Stats., 498)	30,000.00
1906. Continuing construction wagon road, sundry civil act of June 30, 1906 (34 Stats., 744)	50,000.00
1907. Continuing construction wagon road, sundry civil act of Mar. 4, 1907 (34 Stat., 1349)	50,000.00
1908. Continuing construction wagon road, sundry civil act of May 27, 1908 (35 Stats., 365)	50,000.00
1909. Completion of wagon road, sundry civil act of Mar. 4, 1909 (35 Stats., 1005)	25,000.00

[1] Created by act of Mar. 2, 1899 (30 Stats., 993).
[2] By the act of Aug. 14, 1911 (37 Stats., 38), the above-mentioned appropriation was reduced to $5,000.

1910. Additional work upon wagon road, sundry civil act of June 25, 1910 (36 Stats., 725)	$25,000.00
Total	240,000.00

RECAPITUATION.

Appropriations under the Interior Department, 1907 to 1918, inclusive	248,900.00
Appropriations expended under the War Department, 1903 to 1910, inclusive	240,000.00
Total	488,900.00

CRATER LAKE NATIONAL PARK, OREG.[1]

UNDER INTERIOR DEPARTMENT.

1902 and 1903. Protection and improvement, deficiency act of July 1, 1902 (32 Stats., 571)	$2,000.00
1904. Protection and improvement, sundry civil act of Mar. 3, 1903 (32 Stats., 1119)	2,000.00
1905. Protection and improvement, sundry civil act of Apr. 28, 1904 (33 Stats., 487)	3,000.00
1906. Protection and improvement, sundry civil act of Mar. 3, 1905 (33 Stats., 1188)	3,000.00
1907. Protection and improvement, sundry civil act of June 30, 1906 (34 Stats., 729)	3,000.00
1908. Protection and improvement, sundry civil act of Mar. 4, 1907 (34 Stats., 1337)	7,315.00
1909. Protection and improvement, sundry civil act of May 27, 1908 (35 Stats., 351)	3,000.00
1910. Protection and improvement, sundry civil act of Mar. 4, 1909 (35 Stats., 990)	3,000.00
1911. Protection and improvement, sundry civil act of June 25, 1910 (36 Stats., 745)	3,000.00
1912. Protection and improvement, sundry civil act of Mar. 4, 1911 (36 Stats., 1421)	3,000.00
1913. Protection and improvement, sundry civil act of Aug. 24, 1912 (37 Stats., 460)	3,000.00
1914. Protection and improvement and repairing and extension of roads, sundry civil act of June 23, 1913 (38 Stat., 50)	7,540.00
1915. Protection and improvement and repairing and extension of roads, sundry civil act of Aug. 1, 1914 (38 Stats., 649)	8,040.00
1916. Protection and improvement and repairing and extension of roads, sundry civil act of Mar. 3, 1915 (38 Stats., 863)	8,000.00
1917. Protection and improvement and repairing and extension of roads, sundry civil act of July 1, 1916 (39 Stats., 308)	8,000.00
1918. Protection and improvement and repairing and extension of roads, sundry civil act of June 12, 1917 (Public No. 21, 65th Congress)	15,000.00
Total	81,895.00

UNDER WAR DEPARTMENT.

1910. Surveying, locating, and preparing plans and estimates for roads and trails in the park, sundry civil act of June 25, 1910 (36 Stats., 725)	10,000.00
1913. Construction of wagon road and necessary bridges through park, with system of tanks and water-supply pipes for sprinkling, sundry civil act of Aug. 24, 1912 (37 Stats., 443)	50,000.00
1914. Continuation of the construction of a wagon road and the necessary bridges through park, with system of tanks and water-supply pipes for sprinkling, sundry civil act of June 23, 1913 (38 Stats., 33)	75,000.00

[1] Created by act of May 22, 1902 (32 Stats., 202).

1915. Continuation of the construction of a wagon road and the necessary bridges through park, with system of tanks and water-supply pipes for sprinkling, sundry civil act of Aug. 1, 1914 (38 Stats., 633)	$85,000.00
1916. Continuation of the construction of a wagon road and the necessary bridges through park, with system of tanks and water-supply pipes for sprinkling, sundry civil act of Mar. 3, 1915 (38 Stats., 845)	50,000.00
1917. Continuation of the construction of a wagon road and the necessary bridges through park, with system of tanks and water-supply pipes for sprinkling, also for maintenance, repair, and operation of two horse-drawn passenger-carrying vehicles, sundry civil act of July 1, 1916 (39 Stats., 289)	50,000.00
1918. For continuation of a wagon road and the necessary bridges through the park, together with a system of tanks and water-supply pipes for sprinkling (H. Doc. 328, 62d Cong., 2d sess.), and for maintenance, repair, and operation of two horse-drawn passenger-carrying vehicles, sundry civil act of June 12, 1917 (Public No. 21, 65th Cong.)	50,000.00
Total	370,000.00

RECAPITULATION.

Appropriations under the Interior Department, 1902 to 1918, inclusive	81,895.00
Appropriations expended under the War Department, 1910 to 1918, inclusive	370,000.00
Total	451,895.00

WIND CAVE NATIONAL PARK, S. DAK.[1]

1904. Protection and improvement, sundry civil act of Mar. 3, 1903 (32 Stats., 1119)	$2,500.00
1905. Protection and improvement, sundry civil act of Apr. 28, 1904 (33 Stats., 487)	2,500.00
1906. Protection and improvement, sundry civil act of Mar. 3, 1905 (33 Stats., 1188)	2,500.00
1907. Protection and improvement, sundry civil act of June 30, 1906 (34 Stats., 729)	4,400.00
1908. Protection and improvement, sundry civil act of Mar. 4, 1907 (34 Stats., 1337)	2,500.00
1909. Protection and improvement, sundry civil act of May 27, 1908 (35 Stats., 352)	2,500.00
1910. Protection and improvement, sundry civil act of Mar. 4, 1909 (35 Stats., 991)	2,500.00
1911. Protection and improvement, sundry civil act of June 25, 1910 (36 Stats., 745)	2,500.00
1912. Management, improvement, and protection, sundry civil act of Mar. 4, 1911 (36 Stats., 1421)	2,500.00
1913. No appropriation made.	
1914. Improvement and protection, sundry civil act of June 23, 1913 (38 Stats., 50)	2,500.00
1915. Protection and improvement, sundry civil act of Aug. 1, 1914 (38 Stats., 649)	2,500.00
1916. Protection and improvement, sundry civil act of Mar. 3, 1915 (38 Stats., 863)	2,500.00
1917. Protection and improvement, sundry civil act of July 1, 1916 (39 Stats., 308)	2,500.00
1918. For improvement and protection, sundry civil act of June 12, 1917 (Public No. 21, 65th Cong.)	2,500.00
Total	36,900.00

[1] Created by act of Jan. 9, 1903 (32 Stats., 765).

UNDER DEPARTMENT OF AGRICULTURE.[1]

1913.	For the establishment of a national game preserve, to be known as the Wind Cave National Game Preserve, upon the land embraced within the boundaries of the Wind Cave National Park, in the State of South Dakota, for a permanent national range for a herd of buffalo to be presented to the United States by the American Bison Society, and for such other native American game animals as may be placed therein. The Secretary of Agriculture is authorized to acquire by purchase or condemnation such adjacent lands as may be necessary for the purpose of assuring an adequate permanent water supply, and to inclose the said game preserve with a good and substantial fence and to erect thereon all necessary sheds and buildings for the proper care and maintenance of the said animals, to be available until expended, Agricultural act of August 10, 1912 (37 Stats., 293)	$26,000.00

RECAPITULATION.

Appropriations under the Interior Department, 1904 to 1918, inclusive	36,900.00
Appropriation expended under the Department of Agriculture, appropriated for the fiscal year 1913 and made available until expended	26,000.00
Total	62,900.00

MESA VERDE NATIONAL PARK, COLO.[2]

1908.	Protection and improvement, sundry civil act of Mar. 4, 1907 (34 Stats., 1337)	$7,500.00
1909.	Protection and improvement, sundry civil act of May 27, 1908 (35 Stats., 351)	7,500.00
1910.	Protection and improvement, sundry civil act of Mar. 4, 1909 (35 Stats., 990)	7,500.00
1911.	Protection and improvement, inclusive of $12,500 reserved within appropriation for construction of main wagon road through the park, sundry civil act of June 25, 1910 (36 Stats., 745)	20,000.00
	For examination and leasing, etc., of coal lands in the park, deficiency act of June 25, 1910 (36 Stats., 796)	2,000.00
1912.	Protection and improvement, sundry civil act of Mar. 4, 1911 (36 Stats., 1421)	7,500.00
1913.	Protection and improvement, sundry civil act of Aug. 24, 1912 (37 Stats., 460)	15,000.00
1914.	Protection and improvement, sundry civil act of June 23, 1913 (38 Stats., 50)	10,000.00
1915.	Protection and improvement, sundry civil act of Aug. 1, 1914 (38 Stats., 649)	10,000.00
1916.	Protection and improvement, including not exceeding $456 for maintenance and repair of horse-drawn passenger-carrying vehicle, sundry civil act of Mar. 3, 1915 (38 Stats., 863)	10,000.00
1917.	Protection and improvement, including not exceeding $433 for maintenance and repair of horse-drawn passenger-carrying vehicles, sundry civil act of July 1, 1916 (39 Stats., 308)	10,000.00
1918.	Protection and improvement, including not exceeding $433 for maintenance and repair of horse-drawn passenger-carrying vehicles for use of superintendent and employees, sundry civil act of June 12, 1917 (Public No. 21, 65th Congress)	10,000.00
	Total	117,000.00

[1] Funds for the maintenance and further improvement of this game preserve are allotted each year from lump-sum appropriations for the Biological Survey, Department of Agriculture.

[2] Created by act of June 29, 1906 (34 Stats., 616).

PLATT NATIONAL PARK.[1] (Formerly Sulphur Springs Reservation, Okla.)

[From July 1, 1902, to June 25, 1910, no appropriations for the park were made by Congress.]

1909 and 1910. Appropriation of $16,000 for certain specified improvements out of park-revenue fund. This was ineffective, as the revenue-fund balance was only sufficient to carry a reduced force of employees for the proper protection of the park, sundry civil act of Mar. 4, 1909 (35 Stats., 991).	
1911. Care and maintenance, including all personal services, sundry civil act of June 25, 1910 (36 Stats., 745)	$5,000.00
1912. Maintenance, bridging, roads, trails, and sewerage, sundry civil act of Mar. 4, 1911 (36 Stats., 1420)	10,000.00
1913. Maintenance, bridging, roads, and trails, sundry civil act of Aug. 24, 1912 (37 Stats., 460)	8,000.00
1913. Construction sanitary sewer (contingent on city of Sulphur, Okla., appropriating a similar sum), Indian appropriation act of Aug. 24, 1912 (37 Stats., 532)	17,500.00
1914. Maintenance, bridging, roads, and trails, deficiency appropriation act of Oct. 22, 1913 (38 Stats., 218)	8,000.00
1915. Maintenance, bridging, roads, and trails, sundry civil act of Aug. 1, 1914 (38 Stats., 649)	8,000.00
1916. Maintenance, bridging, roads, and trails, sundry civil act of Mar. 3, 1915 (38 Stats., 863)	8,000.00
To cover the cost of repairing damage to bridges, roads, trails, buildings, etc., deficiency appropriation act of Mar. 31, 1916 (39 Stats., 42)	10,000.00
1917. For improvement and protection, sundry civil act of July 1, 1916 (39 Stats., 308)	8,000.00
1918. For improvement and protection, sundry civil act of June 12, 1917 (Public No. 21, 65th Congress)	7,180.00
Total	89,680.00

SULLYS HILL PARK, N. DAK.[2]

UNDER THE DEPARTMENT OF THE INTERIOR.

[From June 2, 1904 to June 30, 1913, no appropriations for the park were made by Congress.]

1914. For examination of the land embraced in Sullys Hill Park to determine whether it contains valuable minerals, Indian appropriation act of June 30, 1913 (38 Stats., 92)	$500.00

UNDER DEPARTMENT OF AGRICULTURE.

1915. For the improvement of the game preserve in the park, Agricultural appropriation act of June 30, 1914 (38 Stats., 434)	5,000.00
1916. For the improvement of the game preserve in the park, including construction of fences, sheds, buildings, corrals, roads, and other structures which may be necessary, Agricultural appropriation act of Mar. 4, 1915 (38 Stats., 1105)	5,000.00
1917. For the improvement of the game preserve in the park, including construction of fences, sheds, buildings, corrals, roads, and other structures which may be necessary, Agricultural appropriation act of Aug. 11, 1916 (39 Stats., 467)	5,000.00

[1] Created by acts of July 1, 1902 (32 Stats., 641), and Apr. 21, 1904 (33 Stats., 220); name changed by joint resolution of June 29, 1906 (34 Stats., 837).

[2] Created by executive proclamation of June 2, 1904, under the act approved Apr. 27, 1904 (33 Stats., 319).

1918. For the maintenance and improvement of the game preserves in Sullys Hill National Park, including the construction of all fences, sheds, buildings, corrals, roads, and other structures which may be necessary, in addition to the amount heretofore appropriated, available until expended, Agricultural appropriation act of Mar. 4, 1917 (Public No. 390, 64th Congress)	$5,000.00
Total	20,000.00

RECAPITULATION.

Appropriations under the Interior Department, fiscal year 1914	500.00
Appropriations expended under the Department of Agriculture, 1914 to 1917, inclusive	20,000.00
Total	20,500.00

ROCKY MOUNTAIN NATIONAL PARK.[1]

1915. For protection and improvement, deficiency appropriation act of Mar. 4, 1915 (38 Stats., 1148)	$3,000.00
1916. For protection and improvement, sundry civil act of Mar. 3, 1915 (38 Stats., 863)	8,000.00
1917. For protection and improvement, sundry civil act of July 1, 1916 (39 Stats., 308)	10,000.00
1918. For protection and improvement, sundry civil act of June 12, 1917 (Public No. 21, 65th Cong.)	10,000.00
Total	31,000.00

HOT SPRINGS RESERVATION, ARK.[2]

[From Apr. 20, 1832, to Mar. 3, 1877, no appropriations were made by Congress.]

TITLE: PROTECTION AND IMPROVEMENT, HOT SPRINGS RESERVATION.[3]

Specific appropriations by Congress from revenue fund.

1893. Improvement of Whittington Lake Reserve from proceeds of sale of lots included in above fund, 1892,[4] sundry civil act Aug. 5, 1892 (27 Stats., 373)	[5] $30,000.00
1896. To repay expenditures upon a sewer, 1896, act May 1, 1896 (29 Stats., 110)	[5] 930.00
1913. For survey for storm drainage and sanitary sewer system city of Hot Springs, abutting Hot Springs Reservation, sundry civil act of Aug. 24, 1912 (37 Stats., 457)	5,000.00
1918. For the employment of a landscape engineer and such other expenses as may be required for the preparation of a practical and comprehensive plan, together with an accurate estimate of the cost thereof, for improving the Hot Springs Reservation, sundry civil act of June 12, 1917 (Public No. 21, 65th Cong.)	10,000.00
Total	45,930.00

TITLE: IMPROVEMENT, HOT SPRINGS RESERVATION.[3]

Specific appropriation by Congress from revenue fund.

Improvement of Hot Springs Creek, 1883,[4] sundry civil act of Aug. 7, 1882 (22 Stats., 329)	[5] $33,744.78

This amount accrued to the revenue fund from operation of the bathhouses by the Court of Claims receiver in 1878.

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[1] Created by act of Jan. 26, 1915 (38 Stats., 798).
[2] Created by acts of Apr. 20, 1832 (4 Stats., 505); Mar. 3, 1877 (19 Stats., 377); and June 16, 1880 (21 Stats., 289).
[3] Designations given on books of Treasury Department.
[4] Years scheduled on books of Treasury Department.
[5] Without year.

TITLE: SALARIES AND EXPENSES, HOT SPRINGS RESERVATION.[1]

Salaries and expenses Hot Springs Commission, 1877,[2] sundry civil act of Mar. 3, 1877 (19 Stats., 356)	[3] $27,500.00
Same as above, 1878, deficiency act of Dec. 15, 1877 (20 Stats., 12)	[3] 15,000.00
Same as above, 1879, act of Dec. 16, 1878 (20 Stats., 258)	[3] 27,000.00
Same as above, 1879, deficiency act of Mar. 3, 1879 (20 Stats., 415)	[3] 12,000.00
Total	[4] 82,000.00

TITLE: PROTECTION AND IMPROVEMENT, HOT SPRINGS RESERVATION.

Specific appropriations by Congress from moneys in Treasury not otherwise appropriated.

Improvement of Hot Springs Creek, 1885,[2] sundry civil act July 7, 1884 (23 Stats., 208)	[5] $75,000.00
Same as above, 1886, sundry civil act Mar. 3, 1885 (23 Stats., 498)	[5] 8,000.00
Same as above, 1887, sundry civil act Aug. 4, 1886 (24 Stats., 239)	[5] 20,000.00
Reservoirs, pumps, piping, and improvement of the free bathhouse, sundry civil act Oct. 2, 1888 (25 Stats., 527)	[5] **36,000.00**
Improvement of the free bathhouse, 1890, deficiency act Apr. 4, 1890 (26 Stats., 40)	[3] 3,200.00
For mains, pipes, pumping engine, etc., 1891, deficiency act of Sept. 30, 1890 (26 Stats., 523)	[3] 5,000.00
Construction of roads, 1892, sundry civil act of Mar. 3, 1891 (26 Stats., 972)	[5] 5,000.00
Total	152,200.00

TITLE: HOT SPRINGS RESERVATION.[1]

Specific appropriations by Congress from moneys in Treasury not otherwise appropriated.

Repairs to roads, drives, etc., and remodeling free bathhouse, 1903,[2] sundry civil act of June 28, 1902 (32 Stats., 456)	[3] $48,562.00
Repairs to roads, etc., and storage reservoir, 1904, sundry civil act of Mar. 3, 1903 (32 Stats., 1119)	[3] 30,500.00
Reimbursement of disbursing officer, 1904, deficiency act of Feb. 18, 1904 (32 Stats., 32)	[3] 500.00
Installation of electric motor for the free bathhouse, 1904, deficiency act of Apr. 27, 1904 (33 Stats., 409)	[5] 1,550.00
For gutters on mountain roads, 1905, sundry civil act of Apr. 28, 1904 (33 Stats., 486)	[5] 8,000.00
Filling lakes in Whittington Park, 1906, sundry civil act of Mar. 3, 1905 (33 Stats., 1188)	[5] 6,000.00
Total	95,112.00

TITLE: CLAIMS FOR CONDEMNATION OF BUILDINGS, HOT SPRINGS RESERVATION.[1]

Specific appropriations (indefinite) from moneys in Treasury not otherwise appropriated (sundry civil act of Mar. 3, 1901).

1902[2]	[3] $26,385.45
1903	[3] 18,372.07
1904	[3] 3,500.00
1911	[5] 2,935.00
Total	51,192.52

[1] Designations given on books of Treasury Department.
[2] Years scheduled on books of Treasury Department.
[3] Without year.
[4] Reimbursable from fund arising from sale of Hot Springs lots, but treated by Treasury Department as a direct appropriation.
[5] Limited to fiscal years.

Recapitulation of specific appropriations, 1877 to 1906, inclusive.

Titles of appropriations.	Specific appropriation from revenue fund.	Specific appropriation from Treasury.	Total.
Protection and improvement, Hot Springs Reservation	$45,930.00	$152,200.00	$193,130.00
Improvement, Hot Springs Reservation	33,744.78		33,744.78
Hot Springs Reservation		95,112.00	95,112.00
Salaries and expenses, Hot Springs Reservation		82,000.00	82,000.00
Claims for condemnation of buildings, Hot Springs Reservation		51,192.52	51,192.52
Total	79,674.78	380,504.52	455,179.30

No appropriations from moneys in the Treasury not otherwise appropriated have been made since the sundry civil act of Mar. 3, 1905, the revenues being ample at the present time to cover all expenses of administration, etc.

National parks, listed by name and date of creation, for which no appropriations have been made since the date of their establishment: Casa Grande Ruin, March 2, 1889 (25 Stats., 961). Hawaii, August 1, 1916 (39 Stats., 432). Lassen Volcanic, August 9, 1916 (39 Stats., 442). Mount McKinley, February 26, 1917 (39 Stats., 938).

NATIONAL MONUMENTS.[1]

ADMINISTERED UNDER THE SUPERVISION OF THE SECRETARY OF THE INTERIOR.

[Prior to the fiscal year 1917 no appropriations were made by Congress for the national monuments.]

National Monuments, General.

1917. Protection of national monuments: For the preservation, development, administration, and protection, sundry civil act of July 1, 1916 (39 Stats., 309) $3,500.00

1918. For the preservation, development, administration, and protection of the national monuments, sundry civil act of June 12, 1917 (Public No. 21, 65th Congress) 5,000.00

Total 8,500.00

Navajo National Monument, Ariz.

1917. For preservation and repair of prehistoric pueblo ruins and cliff dwellings, under supervision of the Smithsonian Institution, Indian appropriation act of May 18, 1916 (39 Stats., 132) 3,000.00

Mukuntuweap National Monument, Utah.

1917. For a proportionate share of the amount required to construct an interstate wagon road or highway through the monument, approximately 15 miles, deficiency appropriation act of Sept. 8, 1916 (39 Stats., 818) 15,000.00

Total 26,500.00

[1] Set apart from public domain under act of June 8, 1906 (34 Stats., 225.)

APPENDIX D.

LEGISLATION.

Legislation affecting the national parks, enacted by Congress since December 1, 1916.

Presidential proclamations relating to the national monuments issued during 1917.

LEGISLATION.

[PUBLIC—No. 316—64TH CONGRESS.]

[H. R. 10124.]

An act to add certain lands to the Rocky Mountain National Park, Colorado.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the eastern boundary line of the Rocky Mountain National Park between the section corner common to sections two and three, township three north, and sections thirty-four and thirty-five, township four north, range seventy-three west, and the township corner common to townships five and six north, ranges seventy-two and seventy-three west, is hereby changed so as to read as follows:

"Beginning at a point on the present eastern boundary line of the Rocky Mountain National Park, Colorado, which is the northwest corner of section two and the northeast corner of section three, township three north, range seventy-three west of the sixth principal meridian, Colorado, running thence east along the township line to its intersection with the main hydrographic divide east of Cow Creek, between section thirty-one, township four north, and section six, township three north, range seventy-two west; thence northwesterly following along said hydrographic divide, passing over Twin Sisters, The Crags, passing west of Lily Lake, and continuing along said hydrographic divide, now between Aspen Brook and Fish Creek and passing over Lily Mountain and Gianttrack Mountain to a point which is the southeast corner of section thirty-four and the southwest corner of section thirty-five, township five north, range seventy-three west; thence north along the section lines between sections thirty-four and thirty-five, twenty-six and twenty-seven, twenty-two and twenty-three, fourteen and fifteen, to the quarter corner common to sections fourteen and fifteen, all in township five north, range seventy-three west; thence east along quarter-section line, through sections fourteen and thirteen, township five north, range seventy-three west and along the continuation of said quarter-section line through section eighteen to the quarter corner common to sections eighteen and seventeen, township five north, range seventy-two west; thence north along the section line between sections eighteen and seventeen, seven and eight, five and six, all in township five north, range seventy-two west, to that point which is the northeast corner of section six and the northwest corner of section five in said township and range; thence west along the township line to the township corner common to townships five and six north, ranges seventy-two and seventy-three west, which is on the present eastern boundary line of the Rocky Mountain National Park, Colorado."

And the lands lying between the present existing eastern boundary and the eastern boundary as changed by this act between said section corner common to sections two and three, township three north, and sections thirty-four and thirty-five, township four north, range seventy-three west, and said township corner common to townships five and six north, ranges seventy-two and seventy-three west, are hereby reserved and withdrawn from settlement, occupancy, or disposal under the laws of the United States, and said tracts are hereby made a part of and included in the Rocky Mountain National Park, and all the provisions of the act to establish the Rocky Mountain National Park in the State of Colorado, and for other purposes, approved January twenty-sixth, nineteen hundred and fifteen, are hereby made applicable to and extended over the lands hereby added to the park.

Approved, February 14, 1917 (39 Stats., 916).

[PUBLIC—No. 353—64TH CONGRESS.]

[S. 5716.]

An act to establish the Mount McKinley National Park, in the Territory of Alaska.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the tract of land in the Territory of Alaska particularly described by and included within the metes and bounds, to wit: Beginning at a point as shown on Plate III, reconnoissance map of the Mount McKinley region, Alaska, prepared in the Geological Survey, edition of nineteen hundred and eleven, said point being at the summit of a hill between two forks of the headwaters of the Toklat River, approximate latitude sixty-three degrees forty-seven minutes, longitude one hundred and fifty degrees twenty minutes; thence south six degrees twenty minutes west nineteen miles; thence south sixty-eight degrees west sixty miles; thence in a southeasterly direction approximately twenty-eight miles to the summit of Mount Russell; thence in a northeasterly direction approximately eighty-nine miles to a point twenty-five miles due south of a point due east of the point of beginning; thence due north twenty-five miles to said point; thence due west twenty-eight and one-half miles to the point of beginning, is hereby reserved and withdrawn from settlement, occupancy, or disposal under the laws of the United States, and said tract is dedicated and set apart as a public park for the benefit and enjoyment of the people, under the name of the Mount McKinley National Park.

SEC. 2. That nothing herein contained shall affect any valid existing claim, location, or entry under the land laws of the United States, whether for homestead, mineral, right of way, or any other purpose whatsoever, or shall affect the rights of any such claimant, locator, or entryman to the full use and enjoyment of his land.

SEC. 3. That whenever consistent with the primary purposes of the park, the act of February fifteenth, nineteen hundred and one, applicable to the location of rights of way in certain national parks and national forests for irrigation and other purposes, shall be and remain applicable to the lands included within the park.

SEC. 4. Nothing in this act shall in any way modify or affect the mineral land laws now applicable to the lands in the said park.

SEC. 5. That the said park shall be under the executive control of the Secretary of the Interior, and it shall be the duty of the said executive authority, as soon as practicable, to make and publish such rules and regulations not inconsistent with the laws of the United States as the said authority may deem necessary or proper for the care, protection, management, and improvement of the same, the said regulations being primarily aimed at the freest use of the said park for recreation purposes by the public and for the preservation of animals, birds, and fish and for the preservation of the natural curiosities and scenic beauties thereof.

SEC. 6. That the said park shall be, and is hereby, established as a game refuge, and no person shall kill any game in said park except under an order from the Secretary of the Interior for the protection of persons or to protect or prevent the extermination of other animals or birds: *Provided,* That prospectors and miners engaged in prospecting or mining in said park may take and kill therein so much game or birds as may be needed for their actual necessities when short of food; but in no case shall animals or birds be killed in said park for sale or removal therefrom, or wantonly.

SEC. 7. That the said Secretary of the Interior may, in his discretion, execute leases to parcels of ground not exceeding twenty acres in extent for periods not to exceed twenty years whenever such ground is necessary for the erection of establishments for the accommodation of visitors; may grant such other necessary privileges and concessions as he deems wise for the accommodation of visitors; and may likewise arrange for the removal of such mature or dead or down timber as he may deem necessary and advisable for the protection and improvement of the park: *Provided,* That no appropriation for the maintenance of said park in excess of $10,000 annually shall be made unless the same shall have first been expressly authorized by law.

SEC. 8. That any person found guilty of violating any of the provisions of this act shall be deemed guilty of a misdemeanor, and shall be subjected to a fine of not more than $500 or imprisonment not exceeding six months, or both, and be adjudged to pay all costs of the proceedings.

Approved, February 26, 1917 (39 Stats., 938).

[PUBLIC—No. 370—64TH CONGRESS.]

[S. 784.]

An act to authorize the sale of certain lands at or near Belton, Montana, for hotel purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Interior be, and hereby is, authorized to sell and convey to the Glacier Park Hotel Company, a corporation organized under the laws of the State of Minnesota and authorized to do business in the State of Montana, its successors and assigns, for hotel purposes, and at a price to be fixed by appraisement at not less than $25 per acre, and under such terms, conditions, and regulations as the Secretary of the Interior may prescribe, all that part of the south half of the northwest quarter of section thirty-six, in township thirty-two north, of range nineteen west, Montana principal meridian, within the following described area: Beginning at a point on the southerly line of the right of way of the Great Northern Railway Company, one hundred feet southerly from and at right angles to the center line of the main track of said railway at a point in said center line four hundred and eighty-four feet easterly from its intersection with the west line of said section thirty-six; thence southerly at right angles to said center line three hundred and thirty feet, this course following approximately the line of the westerly fence constructed by the United States Forestry Service in nineteen hundred and nine; thence easterly at right angles to the last-described course six hundred and seventy-two feet; thence northerly at right angles to the last-described course to the said southerly line of right of way, this course following, approximately, the line of the easterly fence constructed by the United States Forestry Service in nineteen hundred and nine; thence westerly along the said southerly line of the right of way of the Great Northern Railway to the place of beginning, excepting therefrom that portion within lot eight, containing five acres, more or less within the Flathead National Forest, at or near Belton, Montana: *Provided, however,* That any hotel erected on said land shall be operated by the said Glacier Park Hotel Company, its successors and assigns, under such rules and regulations as the Secretary of the Interior may prescribe for the conduct and operation of hotels within the Glacier National Park.

Approved, March 2, 1917 (39 Stats., 994).

[PUBLIC—No. 382—64TH CONGRESS.]

[S. 778.]

An act to authorize an exchange of lands with owners of private holdings within the Glacier National Park.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Interior, for the purpose of eliminating private holdings within the Glacier National Park and the preservation intact of the natural forest along the roads in the scenic portions of the park, both on patented and park lands, is hereby empowered, in his discretion, to obtain for the United States the complete title to any or all of the lands held in private or State ownership within the boundaries of said park within townships thirty-two and thirty-three north, ranges eighteen and nineteen west of Montana principal meridian, by the exchange of dead, decadent, or matured timber of approximately equal values that can be removed from any part of the park without injuriously affecting the scenic beauty thereof; or upon the approval of the Secretary of Agriculture, the timber to be selected or exchanged may be taken from the Government lands within the metes and bounds of the national forests within the State of Montana.

SEC. 2. That the value of all patented lands within said park, including the timber thereon, offered for exchange, and the value of the timber on park lands, or on Government lands within the metes and bounds of the national forests within the State of Montana, proposed to be given in exchange for such patented

lands, shall be ascertained in such manner as the Secretary of the Interior and the Secretary of Agriculture may jointly in their discretion direct, and all expenses incident to ascertaining such values shall be paid by the owners of said patented lands; and such owners shall, before any exchange is effective, furnish the Secretary of the Interior evidence satisfactory to him of title to the patented lands offered in exchange; and if the value of timber on park lands or on the Government lands in the national forests within the State of Montana exceeds the value of the patented lands deeded to the Government in exchange, such excess shall be paid to the Secretary of the Interior by the owners of the patented lands before any timber is removed, and shall be deposited and covered into the Treasury as miscellaneous receipts: *Provided*, That the lands conveyed to the Government under this act shall become a part of the Glacier National Park.

SEC. 3. That all timber on Government lands in the park must be cut and removed under regulations to be prescribed by the Secretary of the Interior, and any damage which may result to the roads or any part of the park or the national forests in consequence of the cutting and removal of the timber therefrom shall be borne by the owners of the patented lands, and bonds satisfactory to the Secretary of the Interior and the Secretary of Agriculture, jointly, must be given for the payment of such damages, if any, as shall be determined by the Secretary of the Interior so far as the same relates to lands within a national park and by the Secretary of Agriculture where the same relates to lands in the national forests: *Provided further*, That the Secretary of Agriculture and the Secretary of the Interior shall jointly report to Congress in detail the factors upon which valuations were made.

Approved, March 3, 1917 (39 Stats., 1122).

Excerpt from "An act making appropriations to supply deficiencies in appropriations for the fiscal year ending June thirtieth, nineteen hundred and seventeen, and prior fiscal years, and for other purposes."

NATIONAL PARK SERVICE.

For employees from April fifteenth to June thirtieth, nineteen hundred and seventeen, inclusive, at annual rates of compensation as follows: Director, $4,500; assistant director, $2,500; chief clerk, $2,000; draftsman, $1,800; clerks—one of class three, two of class two, two at $900 each; messenger, $600; in all, for park service in the District of Columbia, $3,666.67, or so much thereof as may be necessary, to be in lieu of salaries, during such period, of the Superintendent of National Parks and four other persons authorized to be employed in the District of Columbia during the fiscal year nineteen hundred and seventeen by the sundry civil appropriation act approved July first, nineteen hundred and sixteen.

Approved, April 17, 1917 (Public, No. 2, 65th Congress).

Excerpts from "An act making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and eighteen, and for other purposes."

INTERIOR DEPARTMENT.

NATIONAL PARKS.

National Park Service: Director, $4,500; assistant director, $2,500; chief clerk, $2,000; draftsman, $1,800; clerks—one of class three, two of class two, two at $900 each; messenger, $600; in all, for park service in the District of Columbia, $17,600.

Yellowstone National Park: For administration and protection, including not exceeding $600 for maintenance and repair of horse-drawn and motor-driven passenger-carrying vehicles for use of the superintendent in making inspections of the park, $5,500: *Provided*, That no part of this appropriation or the revenues of the Yellowstone National Park shall be used for payment of salaries for the protection of the park, authorized by the act of March third, eighteen hundred and eighty-three, to be performed by the detail of troops.

For procuring feed for buffalo, salaries of buffalo keepers, seeding and fencing new meadowlands, irrigation, and so forth, $5,000, to be available immediately.

Glacier National Park, Montana: For administration and improvement, construction of roads, trails, bridges, and telephone lines and the repair thereof, including necessary repairs to the roads from Glacier Park Station through the Blackfeet Indian Reservation to various points in the boundary line of the Glacier National Park, including $1,970 for the purchase and the maintenance of horse-drawn and motor-driven passenger-carrying vehicles for the use of the supervisor and employees in connection with general park work, $115,000.

The Secretary of the Interior is authorized, in his discretion, to accept buildings, moneys, or other property which may be useful in the betterment of the administration and affairs of the Glacier National Park under his supervision and which may be donated for park purposes.

Yosemite National Park, California: For protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, including not exceeding $800 for maintenance and repair of horse-drawn and motor-driven passenger-carrying vehicles for use of the supervisor and employees in connection with general park work, not exceeding $8,000 for a bridge at the old Sentinel Bridge site, and not exceeding $75,000 for grading in width not exceeding twenty feet El Portal-Yosemite Road; also not exceeding $60,000 for the completion of the installation of the hydroelectric power plant authorized by the sundry civil act for the fiscal year nineteen hundred and seventeen; in all, $235,000: *Provided*, That the unexpended balance of the appropriation of $150,000 for the fiscal year nineteen hundred and seventeen for the hydroelectric power plant is made available for the fiscal year nineteen hundred and eighteen.

Sequoia National Park, California: For protection and improvement, construction and repair of bridges, fences, and trails, improvement of roads other than toll roads, $25,000.

General Grant National Park, California: For protection and improvement, construction of fences and trails, and repairing and extension of roads, $2,000.

Mount Rainier National Park, Washington: For protection and improvement, construction of roads, bridges, fences, and trails, and improvement of roads, including not exceeding $1,250 for the purchase of a motor-driven vehicle and the maintenance and repair thereof, $75,000.

Hereafter the Secretary of the Interior is authorized to accept patented lands or rights of way over patented lands in the Mount Rainier National Park that may be donated for park purposes.

Mesa Verde National Park, Colorado: For protection and improvement, including not exceeding $433 for maintenance and repair of horse-drawn passenger-carrying vehicles for use of the superintendent and employees, $10,000.

Hereafter the Secretary of the Interior is authorized to accept patented lands or rights of way over patented lands in the Mesa Verde National Park that may be donated for park purposes.

Hereafter the Secretary of the Interior is authorized to accept for park purposes any lands and rights of way, including the Grandfather Mountain, near or adjacent to the Government forest reserve in western North Carolina.

Rocky Mountain National Park, Colorado: For protection and improvement, $10,000.

Hereafter the Secretary of the Interior is authorized to accept patented lands or rights of way over patented lands in the Rocky Mountain National Park that may be donated for park purposes.

Crater Lake National Park, Oregon: For protection and improvement, and repairing and extension of roads, $15,000.

Hereafter the Secretary of the Interior is authorized to accept patented lands or rights of way over patented lands in the Crater Lake National Park that may be donated for park purposes.

Wind Cave National Park, South Dakota: For improvement and protection, $2,500.

Platt National Park, Oklahoma: For improvement and protection, $7,180.

Protection of national monuments: For the preservation, development, administration, and protection of the national monuments, to be expended under the direction of the Secretary of the Interior, $5,000.

From and after July first, nineteen hundred and eighteen, all revenues of the national parks, except Hot Springs Reservation, Arkansas, shall be covered into the Treasury to the credit of miscellaneous receipts; and the Secretary of the Interior is directed to submit, for the fiscal year nineteen hundred and nineteen and annually thereafter, estimates of the amounts required for the care, maintenance, and development of the said parks.

Hot Springs Reservation, Arkansas: For the employment of a landscape engineer and such other expenses as may be required for the preparation of a practical and comprehensive plan, together with an accurate estimate of the cost thereof, for improving the Hot Springs Reservation, there is authorized to be expended from the revenues received from the said reservation the sum of $10,000.

WAR DEPARTMENT.

Yellowstone National Park: For maintenance and repair of improvements $147,500, including not to exceed $5,000 for maintenance of the road in the forest reserve leading out of the park from the east boundary, and not to exceed $7,500 for maintenance of the road in the forest reserve leading out of the park from the south boundary, and including not exceeding $3,000 for purchase, operation, maintenance, and repair of motor-driven and horse-drawn passenger-carrying vehicles to be used for inspection of roads and road work, to be expended by and under the direction of the Secretary of War: *Provided*, That no portion of this appropriation shall be expended for the removal of snow from any of the roads for the purpose of opening them in advance of the time when they will be cleared by seasonal changes.

For resurfacing and for finishing the belt line with oil macadam, $20,000.

Crater Lake National Park, Oregon: For continuation of a wagon road and the necessary bridges through the park, together with a system of tanks and water-supply pipes for sprinkling, in accordance with the recommendations in House Document Numbered Three hundred and twenty-eight, Sixty-second Congress, second session, and for maintenance, repair, and operation of two horse-drawn passenger-carrying vehicles, to be expended under the direction of the Secretary of War, $50,000.

Approved June 12, 1917 (Public No. 21, 65th Congress).

PRESIDENTIAL PROCLAMATIONS.

El Morro National Monument, New Mexico.

(Second proclamation.)

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA.

A Proclamation.

Whereas it appears that the public good will be promoted by adding to the El Morro National Monument certain lands within the State of New Mexico containing ruins of archæological value:

Now, therefore, I, Woodrow Wilson, President of the United States of America, by virtue of the power in me vested by section two of the act of Congress approved June 8, 1906, entitled "An act for the preservation of American antiquities," do proclaim that a tract described as the southeast quarter of the northwest quarter and the northeast quarter of the southwest quarter of section six, township nine north, range fourteen west, New Mexico principal meridian, is hereby reserved from appropriation and use of all kinds under all of the public-land laws, subject to all prior valid adverse claims, and set apart as an addition to the El Morro National Monument, and that the boundaries of said national monument are now as shown on the diagram hereto annexed and forming a part hereof.

Warning is hereby expressly given to all unauthorized persons not to appropriate, injure, remove, or destroy any feature of this national monument, or to locate or settle on any of the lands reserved by this proclamation.

In witness whereof I have hereunto set my hand and caused the seal of the United States to be affixed.

Done at the city of Washington this 18th day of June, in the year of our Lord one thousand nine hundred and seventeen, and of the independence of the United States the one hundred and forty-first.

[SEAL.] WOODROW WILSON.

By the President:

ROBERT LANSING,
Secretary of State.

[No. 1377.]

VERENDRYE NATIONAL MONUMENT, NORTH DAKOTA.

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA.

A PROCLAMATION.

Whereas a high and imposing butte, locally known as Crowhigh Mountain, located in township 192 north, range 93 west of the fifth principal meridian, North Dakota, was discovered and utilized between 1738 and 1742 by Verendrye, an explorer of New France and the first white man known to have entered upon the territory now embraced within the present State of North Dakota, as an observation station from which to spy out the farther and unknown West; and

Whereas this lofty natural summit, both because of its usefulness as stated and because it marks the spot where the Verendrye party first crossed the Missouri River in their journey to the Rocky Mountains, thus giving the place great historic interest, and it appears that the public interests will be promoted by reserving the lands upon which Crowhigh Mountain is located as a national monument:

Now, therefore, I, Woodrow Wilson, President of the United States of America, by virtue of the power and authority in me vested by section two of the act of Congress entitled, "An act for the preservation of American antiquities," approved June 8, 1906 (34 Stat., 225), do proclaim that there are hereby reserved from all forms of appropriation under the public-land laws, and set apart as the Verendrye National Monument, all the tracts of land in the State of North Dakota shown upon the diagram hereto attached and made a part hereof, and more particularly described as follows, to wit, the southeast quarter, the southeast quarter of the southwest quarter, and lots four and five, in section fourteen, township one hundred and fifty-two north, range ninety-three west, of the fifth principal meridian.

Warning is hereby given to all unauthorized persons not to appropriate or injure any natural feature of this monument or to occupy, exploit, settle, or locate upon any of the lands reserved by this proclamation.

In witness whereof I have hereunto set my hand and caused the seal of the United States to be affixed.

Done at the city of Washington this 29th day of June, in the year of our Lord one thousand nine hundred and seventeen, and of the independence of the United States the one hundred and forty-first.

[SEAL.] WOODROW WILSON.

By the President:

ROBERT LANSING,
Secretary of State.

[No. 1380.]

APPENDIX E.

BIBLIOGRAPHIES.

Bibliography of books and magazine articles on national-park subjects. September, 1916–October, 1917.

Bibliography of books, Government reports, and magazine articles on Mount McKinley National Park.

BIBLIOGRAPHY OF BOOKS AND MAGAZINE ARTICLES ON NATIONAL-PARK SUBJECTS, SEPTEMBER, 1916–OCTOBER, 1917.

BOOKS.

Your National Parks. By Enos A. Mills. Houghton Mifflin Co., Boston and New York, 1917. Price, $2.50. Illustrated.

Glacier National Park, Its Trails and Treasures. By Mathilde Edith Holtz and Katherine Isabel Bemis. J. H. Doran & Co. 262 pages. 1917. Price, $2. Illustrated.

Mount Rainier, A Record of Explorations. By Edmond S. Meany. The Macmillan Co. 300 pages. 1917. Price, $2. By mail, 10 cents extra. Illustrated.

The Top of the Continent. By Robert Sterling Yard. Scribners. 244 pages. 1917. Price, 75 cents. Illustrated.

Going Abroad Overland. By Rev. Dr. David M. Steele. Putnams. 197 pages. 1917. Price, $1.50. Illustrated.

Hunting in the Yellowstone. Edited by Horace Kephart. 1917. A reprint of "The Great Divide: Travels in the Upper Yellowstone in the Summer of 1874," by the Earl of Dunraven. First published in 1876.

In the Alaskan Wilderness. By George Byron Gordon. 1917. The John C. Winston Co. Price, $3.50 net. Illustrated.

MAGAZINE ARTICLES.

ALBATROSS, THE.

Vol. 5 (January, 1917), p. 12. "From Yellowstone to Cleveland."
Vol. 5 (January, 1917), pp. 13, 14, 20. "Southern Utah as a touring Mecca."
Vol. 5 (March, 1917), p. 12. "'The Radiator' Rock in Yosemite Valley."
Vol. 5 (March, 1917), p. 21. "The passing of the stage coach."
Vol. 5 (March, 1917), p. 23. "Through snow-tented firs to Mount Tacoma."
Vol. 6 (May, 1917), p. 2. "Statement by Secretary Franklin K. Lane of the Interior Department."
Vol. 6 (May, 1917), pp. 3–4. "The playground of a Nation."
Vol. 6 (May, 1917), pp. 5–6. "Among the granite peaks and precipices of the Rocky Mountain National Park."
Vol. 6 (May, 1917), pp. 7–8. "The falls, cliffs, and snowy peaks of the Yosemite National Park."
Vol. 6 (May, 1917), pp. 9–10. "Alpine scenery surpassed in the Glacier National Park."
Vol. 6 (May, 1917), pp. 11–14. "The volcano that collapsed."
Vol. 6 (May, 1917), pp. 15–18. "Exploring the ice caves and snow fields of the Mount Rainier National Park."
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Vol. 70 (June, 1917), pp. 342–348. "Outdoors in the Puget Sound country." (Mount Rainier.)
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Vol. 115 (Apr. 25, 1917), pp. 726, 728. "Our national forests and parks."
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Vol. 68 (December, 1916), pp. 553, 556. "Uncle Sam's latest playground." (Lassen Volcanic National Park.)

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PACIFIC GOLF AND MOTOR—Continued.

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Vol. 56 (May, 1917), pp. 206–208. "Recreation Men—III. The Kolb Brothers of Grand Canyon, Arizona."

Vol. 56 (May, 1917), pp. 215, 216, 229, 230. "To Wyoming to hunt elk." By Henry Bannon.

Vol. 56 (June, 1917), pp. 261–263. "Where the seeing is good." By Edward Cave.

Vol. 56 (June, 1917), pp. 268–276. "The hub of our national park system." By Arthur Chapman. (Rocky Mountain.)

Vol. 56 (June, 1917), pp. 276, 277, 300. "Once more—must our elk herds be exterminated?"

Vol. 57 (July, 1917), pp. 11–13. "Recreation Men—IV. C. M. Russell, the Cowboy artist." (Glacier.)

Vol. 57 (July, 1917), pp. 19–20. "A hike through Yellowstone Park to the Tetons." By Arthur C. Tate.

Vol. 57 (August, 1917), p. 85. "Game in Mount McKinley National Park."

Vol. 57 (August, 1917), pp. 101–104. "Our elk policy."

Vol. 57 (September, 1917), p. 142. "Mount Rainier's name stands."

Vol. 57 (September, 1917), pp. 142–143. "Chicago 'mountains.'" (Sand dunes.)

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Vol. 55 (June, 1917), pp. 635–640. "New national parks." By Guy E. Mitchell.

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Vol. 11 (June, 1917), pp. 7–8, 21. "Roads in Yellowstone National Park."

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Vol. 11 (September, 1917), pp. 42–44. "The summer playground of America—visited by thousands of motorists."

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August 25, 1917, p. 23. "Who's who—and why." Stephen T. Mather.
September 8, 1917, pp. 57, 59. "Where rolls the Hudson." By Enos A. Mills. (Palisades Interstate Park.)

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Vol. 83 (Apr. 7, 1917), pp. 216–217. "The eruption of Mount Lassen." By A. H. Palmer.
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ST. NICHOLAS.

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SUNSET.

Vol. 37 (September, 1916), pp. 21–33. "On barking Betsy to the mountain—A motorcycle run to Mount Rainier National Park." By H. M. Laing.
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Vol. 37 (December, 1916), pp. 24–25. "Chugging over and through Colorado." By H. M. Laing.
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Vol. 39 (July, 1917), pp. 42–43, 82, 85, 88. "Main traveled roads in the sunset country."
Vol. 39 (August, 1917), p. 6. "World's highest regatta, Grand Lake, Rocky Mountain National Park."
Vol. 39 (August, 1917), pp. 36–38, 71. "Summer homes for everybody."
Vol. 39 (August, 1917), p. 74. "Two miles high on high gear." By Lindsey Howell. (Rocky Mountain.)
Vol. 39 (September, 1917), pp. 30, 66. "Girls will be guides." By Metta M. Loomis. (Rocky Mountain.)
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Vol. 39 (September, 1917), pp. 38–40, 73, 74. "Over the top." By Kathryne Wilson.

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Vol. 8 (September, 1916), pp. 7–10. "Impressions of a recent auto tour to Lake Tahoe." (Yosemite.)
Vol. 8 (September, 1916), pp. 14–16. "Two thousand mile inspection tour by club car." (Yosemite, Sequoia.)
Vol. 9 (June, 1917), pp. 7–13. "Highways are open to Tahoe and the national parks." (Yosemite.)
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APPENDIX F.

NATIONAL PARKS PUBLICATIONS.

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NATIONAL PARKS PUBLICATIONS.

(Mailed free of charge upon application to the Director of the National Park Service.)

Progress in the Development of the National Parks. By Stephen T. Mather, Director of the National Park Service. 1916. 39 pages.

Contains a statement of results accomplished in development of the national parks, and an outline of their needs in the way of improvement and management.

Annual Report of the National Park Service for the Year 1917. By Horace M. Albright, Acting Director.

Contains summary of the operation and development of the national parks for current year, photographs of more important improvements, reports of park supervisors, national park and monument statistics, etc.

Glimpses of our National Parks. By Robert Sterling Yard, chief, educational division, National Park Service. 40 pages.

Contains descriptions of the most important features of the principal national parks and the Grand Canyon of the Colorado.

General Information Regarding the National Monuments.

Contains descriptions of all national monuments administered by the Department of the Interior, the Department of Agriculture, and the War Department.

Report on the Proposed Sand Dunes National Park, Indiana. By Stephen T. Mather, Director of the National Park Service. 1917. 113 pages.

Contains description and maps of the sand dunes, the history of the project, and the hearings held in Chicago October 30, 1916.

Information circular containing data regarding hotels, camps, points of interest, books, magazine articles, maps, regulations, etc., about each of the following national parks:

Yellowstone.	Mesa Verde.	Glacier.
Yosemite.	Sequoia and	Rocky Mountain.
Mount Rainier.	General Grant.	Wind Cave.
Crater Lake.	Hot Springs.	Casa Grande Ruin.

Map showing all national parks and national monuments with railroad connections.

Automobile road and trail map of each of the following national parks:

Yellowstone.	Sequoia and	Glacier.
Yosemite.	General Grant.	Rocky Mountain.
Mount Rainier.	Crater Lake.	

The following named publications relating to Sieur de Monts National Monument:

Announcement by the Government of the creation of the Sieur de Monts National Monument by Presidential Proclamation on July 8, 1916.

Addresses at meeting held at Bar Harbor on August 22, 1916, to commemorate the establishment of the Sieur de Monts National Monument.

The Sieur de Monts National Monument as a Bird Sanctuary.

The Coastal Setting, Rocks and Woods of the Sieur de Monts National Monument.

An Acadian Plant Sanctuary.

Wild Life and Nature Conservation in the Eastern States.

Man and Nature. Our Duty to the Future.

The Acadian Forest.

The Sieur de Monts National Monument as commemorating Acadia and early French influences of Race and Settlement in the United States.

Purchas translation of de Monts' Commission. De Monts: an Appreciation.

Natural Bird Gardens on Mount Desert Island.

The Sieur de Monts National Monument and its Historical Associations.

Garden Approaches to the National Monument. The White Mountain National Forest. Crawford Notch in 1797.

SOLD BY THE SUPERINTENDENT OF DOCUMENTS.

(Remittances for publications listed below should be by money order, payable to the Superintendent of Documents, Government Printing Office, Washington, D. C., or in cash. Checks and postage stamps can not be accepted.)

PAMPHLETS.

Geological History of Yellowstone National Park. By Arnold Hague. 1912. 24 pages, including 10 illustrations. 10 cents.

Contains a general résumé of the geologic forces that have been active in the Yellowstone National Park.

Geysers. By Walter Harvey Weed. 1912. 32 pages, including 23 illustrations. 10 cents.

In this pamphlet is a description of the forces which have produced the geysers.

Fossil Forests of Yellowstone National Park. By F. H. Knowlton. 1914. 32 pages, including 15 illustrations. 10 cents.

Contains descriptions of the fossil forests of the Yellowstone National Park and an account of their origin.

Fishes of the Yellowstone National Park. By W. C. Kendall. (Bureau of Fisheries Document 818.) 1915. 28 pages, including 17 illustrations. 5 cents.

Contains descriptions of the species and lists of streams where found.

Origin of the Scenic Features of Glacier National Park. By M. R. Campbell. 1914. 42 pages, including 25 illustrations. 15 cents.

Contains a general account of the forces that have caused the development of the mountain ranges, the valleys, and lakes of Glacier National Park.

Glaciers of Glacier National Park. By W. C. Alden. 1914. 48 pages, including 30 illustrations. 15 cents.

Contains descriptions of the principal features of the larger glaciers in the park.

Some Lakes of Glacier National Park. By M. J. Elrod. 1912. 32 pages, including 19 illustrations. 10 cents.

Contains a description of some of the principal lakes, with special reference to the possibility of stocking the lakes with fish.

Glacier National Park—A Popular Guide to Its Geology and Scenery. By M. R. Campbell. (Bulletin 600, U. S. Geological Survey.) 1914. 54 pages, 13 plates, including map. 30 cents.

Geological History of Crater Lake. By J. S. Diller. 1912. 32 pages, including 28 illustrations. 10 cents.

Contains an account of the formation of Crater Lake.

Forests of Crater Lake National Park. By J. F. Pernot. 1916. 40 pages, including 26 illustrations. 20 cents.

Contains descriptions of the forest cover and of the principal species.

Features of the Flora of Mount Rainier National Park. By J. B. Flett. 1916. 48 pages, including 40 illustrations. 25 cents.

Contains descriptions of the flowering trees and shrubs in the park.

Forests of Mount Rainier National Park. By G. F. Allen. 1916. 32 pages, including 27 illustrations. 20 cents.

Contains descriptions of the forest cover and of the principal species.

Mount Rainier and Its Glaciers. By F. E. Matthes. 1914. 48 pages, including 26 illustrations. 15 cents.

Contains a general account of the glaciers of Mount Rainier, and of the development of the valleys and basins surrounding the peak.

Sketch of Yosemite National Park and An Account of the Origin of Yosemite and Hetch Hetchy Valleys. By F. E. Matthes. 1912. 48 pages, including 24 illustrations. 10 cents.

Contains a description of the general features of the Sierra Nevada and the Yosemite National Park and an account of the origin of the Yosemite and Hetch Hetchy Valleys.

Forests of Yosemite, Sequoia, and General Grant National Parks. By C. L. Hill. 1916. 40 pages, including 23 illustrations. 20 cents.

Contains descriptions of the forest cover and of the principal species.

The Secret of the Big Trees—Yosemite, Sequoia, and General Grant National Parks. By Ellsworth Huntington. 1913. 24 pages, including 14 illustrations. 5 cents.

Contains an account of the climatic changes that are indicated by the thickness of the growth rings in the big trees, and gives a comparative statement of the climatic conditions in California and Asia during a period of 3,400 years.

Antiquities of the Mesa Verde National Park: Spruce Tree House. By J. W. Fewkes. (Bull. 41, Bureau of American Ethnology.) 1909. 58 pages, 21 plates, 37 text figures. 40 cents.

Contains a detailed account of the structure and of the objects found in it.

Antiquities of Mesa Verde National Park: Cliff Palace. By J. W. Fewkes. (Bull. 51, Bureau of American Ethnology.) 1911. 82 pages, 35 plates, 4 text figures. 45 cents.

Contains a detailed account of the structure and of the objects found in it.

Excavation and Repair of Sun Temple. By J. W. Fewkes. 1916. 32 pages, including 18 illustrations. 15 cents.

Contains an account of a new ruin discovered in 1915.

Analyses of the Waters of the Hot Springs of Arkansas, by J. K. Haywood, and Geological Sketch of Hot Springs, Ark., by Walter Harvey Webb. 56 pages. 10 cents.

Proceedings of the [First] National Park Conference Held at Yellowstone National Park, September 11 and 12, 1911. 210 pages. 15 cents.

Contains a discussion of national-park problems by officers of the Government and other persons.

Proceedings of the [Second] National Park Conference Held at Yosemite National Park, October 14, 15, and 16, 1912. 146 pages. 15 cents.

Consist mainly of a discussion regarding the advisability of admitting automobiles to the national parks.

Proceedings of the [Third] National Park Conference Held at Berkeley, Cal., March 11, 12, and 13, 1915. 1915. 166 pages. 20 cents.

Contains discussions of national-park problems by officers of the Government and others.

Proceedings of the [Fourth] National Park Conference held at Washington, D. C., January 2 to 6, 1917. 362 pages. 25 cents.

Contains discussions of national-park problems by officers of the Government and others.

The National-Parks Portfolio. By Robert Sterling Yard, chief, educational division, National Park Service.

Contains nine sections, each descriptive of a national park and one description of the Grand Canyon. 1917. 260 pages, including 270 illustrations. Pamphlet edition, loose in flexible cover, 35 cents; book edition, containing same material securely bound in cloth, 55 cents.

Guidebook of Rocky Mountain National Park. By Dr. Willis T. Lee. 1917.

Contains a detailed description of the park and its various geologic and scenic features. Now in course of publication. Price not ascertained.

PANORAMIC VIEWS.

(The panoramic views listed below are based on accurate surveys and give an excellent idea of the configuration of the surface as it would appear to a person flying over it. The meadows and valleys are printed in light green, the streams and lakes in light blue, the cliffs and ridges in combinations of color, and the roads in light brown. The lettering is printed in light brown and is easily read on close inspection, but merges into the other colors when the sheet is held at some distance.)

Panoramic view of Crater Lake National Park. 16½ x 18 inches, scale 1 mile to the inch. 25 cents.

Panoramic view of Yosemite National Park. 18½ x 18 inches, scale 3 miles to the inch. 25 cents.

Panoramic view of Glacier National Park. 18½ x 21 inches, scale 3 miles to the inch. 25 cents.

Panoramic view of Mount Rainier National Park. 20 x 19 inches, scale 1 mile to the inch. 25 cents.

Panoramic view of Yellowstone National Park. 18 x 21 inches, scale 3 miles to the inch. 25 cents.

Panoramic view of Mesa Verde National Park. 22½ x 19 inches, scale three-fourths mile to the inch. 25 cents.

Panoramic view of Rocky Mountain National Park. 14 x 17½ inches, scale 2 miles to the inch. 25 cents.

MAPS SOLD BY THE U. S. GEOLOGICAL SURVEY.

(The maps listed below may be purchased from the Director of the United States Geological Survey, Washington, D. C. Remittances should be by money order or in cash. Personal checks can not be accepted. A discount of 40 per cent is allowed on all orders for maps amounting to $3 net or more.)

Crater Lake National Park, Oreg. Limiting parallels, 42° 48′ and 43° 04′. Limiting meridians, 122° and 122° 16′. Size, 19 by 22 inches. Scale, 1:62,500, or about 1 mile to 1 inch. Contour interval, 50 feet. An illustrated description of the lake and the manner of its formation is given on the back of the sheet. Price, 10 cents.

Glacier National Park, Mont. Limiting parallels, 48° 14′ 36″ and 49°. Limiting meridians, 113° 10′ and 114° 30′. Size, 31 by 35 inches. Scale, 1:125,000, or about 2 miles to 1 inch. Contour interval, 100 feet. Price, 25 cents.

Mesa Verde National Park, Colo. Limiting parallels, 37° 09′ 18″ and 37° 21′. Limiting meridians, 108° 15′ and 108° 37′ 30″. Size, 31 by 46 inches. Scale, 1:31,250, or about one-half mile to 1 inch. Contour interval, 25 feet. Price, 20 cents.

Mount Rainier National Park, Wash. Limiting parallels, 46° 43′ 43″ and 47° 00′. Limiting meridians, 121° 30′ and 121° 55′. Size, 22 by 23 inches. Scale, 1:62,500, or about 1 mile to 1 inch. Contour interval, 100 feet. Price, 10 cents.

Yellowstone National Park, Wyo.-Mont.-Idaho. Limiting parallels, 44° 08′ 17″ and 45° 01′ 55″. Limiting meridians, 110° and 111° 05′ 53″. Size, 32 by 36 inches. Scale, 1:125,000, or about 2 miles to 1 inch. Contour interval, 100 feet. Price, 25 cents.

Yosemite National Park, Cal. The park limits established by acts of Congress are shown in colors. Limiting parallels, 37° 30′ and 38° 15′ 39″. Limiting meridians, 119° and 120°. Size, 29 by 31 inches. Scale, 1:125,000, or about 2 miles to 1 inch. Contour interval, 100 feet. Price, 25 cents. Also issued folded between covers; price, 40 cents. The Yosemite Valley is shown on a larger scale on the Yosemite Valley map. See below.

(Some of the national parks and reservations are shown in whole or in part on the standard topographic maps, as indicated below.)

Casa Grande Ruin, Ariz. The northern part of this area is shown on the Sacaton map. Scale, 1:62,500, or about 1 mile to 1 inch. Contour interval 50 feet. Price, 10 cents.

General Grant National Park, Cal. Shown on the Tehipite map. Scale, 1:125,000, or about 2 miles to 1 inch. Contour interval, 100 feet. Price, 10 cents.

Hot Springs Reservation, Ark. Shown on the map of Hot Springs and vicinity. Scale, 1:62,500, or about 1 mile to 1 inch. Contour interval, 20 feet. Price, 10 cents.

Platt National Park, Okla. This park is at the town of Sulphur, Murray County, which is shown on the Stonewall map. Scale, 1:125,000, or about 2 miles to 1 inch. Contour interval, 50 feet. Price, 10 cents.

Rocky Mountain National Park, Colo. The greater portion of this park is shown on the Longs Peak map. Scale, 1:125,000, or about 2 miles to 1 inch. Contour interval, 50 feet. Price, 10 cents.

Sequoia National Park, Cal. Shown on the Kaweah and Tehipite maps. Scale, 1:125,000, or about 2 miles to 1 inch. Contour interval, 100 feet. Price of each map, 10 cents.

Wind Cave National Park, S. Dak. Shown on the Harney Peak and Hermosa maps. Scale, 1:125,000, or about 2 miles to 1 inch. Contour interval, 100 feet. Price of each map, 10 cents.

Yosemite Valley, Cal. Shown on the Yosemite Valley map Limiting parallels, 37° 42′ and 37° 47′ 05″. Limiting meridians, 119° 30′ and 119° 43′ 40″. Scale, 1:24,000, or about 2½ inches to 1 mile. Contour interval, 50 feet. Price, 10 cents.

APPENDIX G.

MISCELLANEOUS.

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Program of the (Fourth) National Park Conference 1041

Catalogue of first exhibition of national parks paintings 1043

Schedules of national park tours arranged by the Massachusetts Forestry Association 1046

THE NATIONAL PARK CONFERENCE, WASHINGTON, D. C., JANUARY 2–6, INCLUSIVE, 1917.

PROGRAM.

TUESDAY, JANUARY 2.

Stephen T. Mather, Assistant to the Secretary of the Interior, presiding.

MORNING SESSION, 9.30.

OUR NATIONAL PARKS.

Franklin K. Lane, Secretary of the Interior.
Senator Reed Smoot, of Utah.
Representative Scott Ferris, of Oklahoma.
Representative Irvine L. Lenroot, of Wisconsin.
Representative William Kent, of California.
Carl Vrooman, Assistant Secretary of Agriculture.

AFTERNOON SESSION, 2.15.

DEVELOPMENT OF THE NATIONAL PARKS.

Enos Mills: "The national parks for all the people."
Mrs. John Dickinson Sherman, conservation chairman, General Federation of Women's Clubs: "Women's part in national parks development."
Huston Thompson, jr., Assistant Attorney General: "The public and the national parks."
Prof. Lowell Jackson Thomas, Princeton University: "Typical development at Mount Rainier."

EVENING SESSION, 8.15.

Opening of the first annual exhibition of national parks paintings in the galleries of the National Museum.

WEDNESDAY, JANUARY 3.

Robert Sterling Yard, presiding.

EDUCATIONAL DAY.

MORNING SESSION, 9.30.

George D. Pratt, conservation commissioner of the State of New York: "Organized out of doors."
Prof. E. M. Lehnerts, of the University of Minnesota: "University classes in the national parks."
Philander P. Claxton, United States Commissioner of Education: "Public schools and the national parks."
J. Horace McFarland, president American Civic Association: "Economic destiny of the national parks."

AFTERNOON SESSION, 2.15.

Dr. Charles D. Walcott, secretary Smithsonian Institution: "National parks as a scientific asset."
Arthur E. Bestor, president Chautauqua Institution: "Organized popular education."

Herbert Quick, member of Federal Farm Loan Board: "The author and the national parks."
Gilbert H. Grosvenor, editor National Geographic Magazine: "Teaching by picture."
William H. Holmes, head curator National Gallery of Art: "The painter and the national parks."
Rev. Charles W. Gilkey, of Chicago: "Spiritual uplift of scenery in national parks and the Grand Canyon."

EVENING SESSION, 8.15.

Illustrated lecture by Herbert W. Gleason.

THURSDAY, JANUARY 4.

MORNING SESSION, 9.30.

Enos Mills, presiding.

RECREATIONAL USE OF THE NATIONAL PARKS.

W. A. Welch, chief engineer Palisades Interstate Park: "The making of a recreational park."
J. W. Barber: "Winter sports in the national parks."
Mrs. Ada F. Chalmers: "Family hiking in the national parks."
Dr. Hugh M. Smith, Commissioner of Fisheries: "Fish and fishing in the national parks."
Marion Randall Parson, Sierra Club: "Living in the national parks."

AFTERNOON SESSION, 2.15.

John B. Burnham, president American Game Protective and Propagation Society, presiding.

WILD ANIMAL LIFE IN THE NATIONAL PARKS.

Henry S. Graves, forester and chief, Forest Service: "National forests and national parks in wild life conservation."
Charles Sheldon, chairman game preservation committee, Boone and Crockett Club: "Mount McKinley."
E. W. Nelson, Chief of Bureau of Biological Survey: "The Yellowstone and the game supply."
E. Lester Jones, Suprintendent Coast and Geodetic Survey: "Future of the antelope."
T. S. Palmer, assistant in charge of game preservation, Bureau of Biological Survey: "National monuments as wild animal sanctuaries."
Belmore Brown, Camp Fire Club: "Climbing Mount McKinley."

EVENING SESSION, 8.15.

Illustrated lecture on Mount McKinley, by Stephen R. Capps, geologist, United States Geological Survey.

FRIDAY, JANUARY 5.

MORNING SESSION, 9.30.

Stephen T. Mather, Assistant to the Secretary of the Interior, presiding.

THE QUESTION BOX.

J. B. Harkin, commissioner of Dominion parks, department of the interior, Canada: "Canadian national parks."

AFTERNOON SESSION, 2.15.

Dr. H. M. Rowe, president American Automobile Association, presiding.

MOTOR TRAVEL TO THE PARKS.

George C. Diehl, chairman A. A. A. Good Roads Board: "Touring, a by-product of roads building; or roads building, a by-product of touring."
Cortlandt Field Bishop: "American versus European scenic assets."
Orville Wright: "Air routes to the national parks."
A. W. Seaman, Long Island Automobile Club: "Transcontinental touring equipment."
Frank A. Davis, secretary-treasurer National Old Road Trails: "Sign posting the highways and byways."
David G. Joyce, chairman A. A. A. Touring Board: "Multiplication of American road travel."

EVENING SESSION, 8.15.

Illustrated lectures by H. H. Hays and Judge Will G. Steel.

SATURDAY, JANUARY 6.

Stephen T. Mather, Assistant to the Secretary of the Interior, presiding.

MORNING SESSION, 9.30.

THE GRAND CANYON.

Representative Simeon D. Fess, of Ohio: "Colossus of canyons."
Dr. George Otis Smith, Director United States Geological Survey: "The Survey's contribution to the national park movement."
Ford Harvey: "The public and the Grand Canyon."
Charles Sheldon, chairman game preservation committee Boone and Crockett Club: "Glories of the Cataract Canyon."
L. Claude Way: "Practical problems."

AFTERNOON SESSION, 2.15.

THE GREATER SEQUOIA.

Representative Frederick H. Gillett of Massachusetts: "The problem of the Greater Sequoia."
E. O. McCormick, vice president Southern Pacific Co.: "National parks and the railroads."
Enos Mills: "Perhaps our greatest national park."
Emerson Hough: "The top of America—Mount Whitney."
Robert Sterling Yard: "The Tehipite Valley and Kings Canyon."

EVENING SESSION, 8.15.

Bear stories by Enos Mills.
Illustrated lecture by Dr. Harry O. Reik.

FIRST EXHIBITION OF NATIONAL PARKS PAINTINGS.

CATALOGUE OF A LOAN COLLECTION OF 45 PAINTINGS ILLUSTRATING SCENES MAINLY IN THE NATIONAL PARKS AND MONUMENTS OF THE UNITED STATES, ASSEMBLED BY THE NATIONAL PARK SERVICE IN THE NATIONAL GALLERY OF ART IN CONNECTION WITH THE MEETING OF THE NATIONAL PARK CONFERENCE HELD IN THE NATIONAL MUSEUM, JANUARY 2–6, 1917.

This exhibition was opened with a special view on the evening of January 2. On January 16, 1 painting was withdrawn, and on January 30, 14 paintings were returned to the owners. The remaining 30 continued on exhibition in the main room of the gallery, new building of the National Museum, until after March 5. Those withdrawn before the close of the exhibition are indicated by an asterisk.

DEAN BABCOCK:

*The Twin Sisters.
*A Glimpse of the Range.
The Explorers.
*The Crags.
Scenes in the Rocky Mountain National Park. (Lent by the artist.)

ALBERT BIERSTADT:

Mount Whitney.
The Sequoia National Park. (Lent by the Minneapolis Institute of Arts.)
Whyte's Lake, Estes Park, Colo.
The Rocky Mountain National Park. (Lent by the Art Association of Indianapolis, John Herron Art Institute.)

HOWARD RUSSELL BUTLER:

*Sunrise near Mesa Verde.
The Mesa Verde National Park.
Sunshine and Shadow in The Grand Canyon, Ariz.
Grand Canyon National Monument. (Lent by the artist.)

ELLIOTT DAINGERFIELD:

Trees on the Rim of the Grand Canyon, Arizona.
From Rim to Rim of the Grand Canyon, Arizona.
(Lent by the artist.)

W. HERBERT DUNTON:

*Late into Camp.
*The Hunter's Supper.
The Start for the Hills.
(Lent by the artist.)

J. R. FOUNTAIN:

Crater Lake, Oregon.
The Crater Lake National Park. (Lent by the Southern Pacific Co.)

ALBERT L. GROLL:

Laguna Pueblo.
New Mexico. (Lent by the National Gallery of Art.)

JAMES HENRY HARPER:

Sunset on the Oregon Trail.
(Lent by the artist.)

W. VICTOR HIGGINS:

*Chile Venders, Taos.
Pueblo of Taos, New Mexico. (Lent by the artist.)

THOMAS HILL:

Yosemite Valley.
The Yosemite National Park. (Lent by the Southern Pacific Co.)

SYDNEY M. LAURENCE:

The Trapper.
Alaska.
Mount McKinley.
Alaska.
(Lent by the National Gallery of Art.)

WILLIAM R. LEIGH:

Grand Canyon.
Arizona. (Lent by Snedecor & Co.)

THOMAS MORAN:

A Rocky Mountain Solitude.
The Rocky Mountain National Park. (Lent by the artist.)
In the Grand Canyon of the Colorado.
Arizona. (Lent by the National Gallery of Art.)
Grand Canyon of the Yellowstone.
The Yellowstone National Park. (Lent by the artist.)
Grand Canyon of Arizona on the Santa Fe.
(Lent by the Atchison, Topeka & Santa Fe Railway.)

DE WITT PARSHALL:

The Hermit Creek Canyon, The Grand Canyon.
Arizona. (Lent by the Worcester Art Museum.)
Isis Peak, The Grand Canyon.
Arizona. (Lent by the Syracuse Museum of Fine Arts.)
Granite Gorge, The Grand Canyon.
Arizona. (Lent by the Toledo Museum of Art.)

SHELDON PARSONS:

*Morning in the Canyon.
The Grand Canyon, Ariz. (Lent by the artist.)

F. C. PEYRAUD:

Afternoon in The Grand Canyon.
Arizona. (Lent by the artist.)

EDWARD H. POTTHAST:

The Chasm.
The Grand Canyon, Ariz. (Lent by the artist.)
*Bright Angel Canyon of Arizona on the Santa Fe.
The Grand Canyon, Ariz. (Lent by the Atchison, Topeka & Santa Fe Railway.)

ARTHUR J. E. POWELL:

St. Marys Lake.
Grinnell Lake and Glacier.
Scenes in the Glacier National Park. (Lent by the artist.)

LUCIEN W. POWELL:

Grand Canyon of the Yellowstone.
The Yellowstone National Park. (Lent by the National Gallery of Art.)

WILLIAM RITSCHEL:

Awakening of The Grand Canyon of Arizona.
(Lent by the artist.)

CARL RUNGIUS:

Near Timberline, Bridges Forest Reserve, Wyoming.
The Yellowstone National Park. (Lent by the artist.)

BIRGER SANDZEN:

*Sunset in the Mountains, Colorado.
The Rocky Mountain National Park.
*The Arapahoes.
The Rocky Mountain National Park.
*Sunset in The Grand Canyon.
Arizona. (Lent by the artist.)

E. SERBAROLI:

*Mount Tamalpais.
California. (Lent by Hon. William Kent.)

J. H. TWACHTMAN:

*Waterfall, Yellowstone Park.
The Yellowstone National Park. (Lent by the City Art Museum of St. Louis.)

WALTER UFER:

Indian Gardens.
The Grand Canyon, Arizona. (Lent by the artist.)

PETER VAN VEEN:

*Mount Rockwell, Glacier National Park.
(Lent by the artist.)

F. BALLARD WILLIAMS:

Grand View, The Grand Canyon of Arizona on the Santa Fe.
(Lent by the Atchison, Topeka & Santa Fe Railway.)

SCHEDULE OF NATIONAL PARK TOURS ARRANGED BY THE MASSACHUSETTS FORESTRY ASSOCIATION.

	I.	II.	III.
June 28	Leave Boston	Leave Boston	Leave Boston.
June 29	Leave Chicago	Leave Chicago	Leave Chicago.
June 30	En route	En route	En route.
July 1	Denver	Denver	Denver.
July 2	Rocky Mountain (Estes) Park.	Rocky Mountain (Estes) Park.	Rocky Mountain (Estes) Park.
July 3	do	do	Do.
July 4	En route	En route	En route.
July 5	Yellowstone	Yellowstone	Yellowstone.
July 6	do	do	Do.
July 7	do	do	Do.
July 8	do	do	Do.
July 9	do	do	Do.
July 10	do	do	Do.
July 11	En route	En route	En route.
July 12	Glacier Park	Glacier Park	Glacier Park.
July 13	do	do	Do.
July 14	do	do	Do.
July 15	do	do	Do.
July 16	do	do	Do.
July 17	do	do	Do.
July 18	En route	En route	En route.
July 19	Lake Chelan	Lake Chelan	Lake Chelan.
July 20	Seattle	Seattle	Seattle.
July 21	do	do	Do.
July 22	Mount Rainier	Mount Rainier	Mount Rainier.
July 23	do	do	Do.
July 24	do	do	Do.
July 25	Portland	Portland	Portland.
July 26	do	do	Do.
July 27	do	do	Do.
July 28	Crater Lake	Crater Lake	En route.
July 29	do	do	Do.
July 30	do	do	Chicago.
July 31	San Francisco	San Francisco	En route.
Aug. 1	do	do	Boston.
Aug. 2	do	do	
Aug. 3	Yosemite	Yosemite	
Aug. 4	do	do	
Aug. 5	do	do	
Aug. 6	do	do	
Aug. 7	do	do	
Aug. 7, 8	General Grant Park	Leave Oakland	
Aug. 9	do	Salt Lake City	
Aug. 10	Los Angeles	Royal Gorge	
Aug. 11	do	En route	
Aug. 12	do	Chicago	
Aug. 13, 14	San Diego	Boston	
Aug. 15	Riverside		
Aug. 16	Redlands		
Aug. 17, 18	Grand Canyon		
Aug. 19, 20	En route		
Aug. 21	Chicago		
Aug. 22	Boston		

PRICES.

I—56 days	$605
Chicago to Chicago	552
II—47 days	510
Chicago to Chicago	457
III—34 days	395
Chicago to Chicago	342

SCHEDULE OF NATIONAL PARK TOURS ARRANGED BY THE MASSACHUSETTS FORESTRY ASSOCIATION.—Continued.

	IV.	V.	VI.
July 2	Leave Boston	Leave Boston	Leave Boston.
July 3	Leave Chicago	Leave Chicago	Leave Chicago.
July 4	En route	En route	En route.
July 5	Yellowstone	Yellowstone	Yellowstone.
July 6	do	do	Do.
July 7	do	do	Do.
July 8	do	do	Do.
July 9	do	do	Do.
July 10	do	do	Do.
July 11	En route	En route	En route.
July 12	Glacier Park	Glacier Park	Glacier Park.
July 13	do	do	Do.
July 14	do	do	Do.
July 15	do	do	Do.
July 16	do	do	Do.
July 17	do	do	Do.
July 18	En route	En route	En route.
July 19	Lake Chelan	Lake Chelan	Lake Chelan.
July 20	Seattle	Seattle	Seattle.
July 21	do	do	Do.
July 22	Mt. Rainier	Mt. Rainier	Mt. Rainier.
July 23	do	do	Do.
July 24	do	do	Do.
July 25	Portland	Portland	Portland.
July 26	do	do	Do.
July 27	do	do	Do.
July 28	Crater Lake	Crater Lake	En route.
July 29	do	do	Do.
July 30	do	do	Chicago.
July 31	San Francisco	San Francisco	En route.
Aug. 1	do	do	Boston.
Aug. 2	do	do	
Aug. 3	Yosemite	Yosemite	
Aug. 4	do	do	
Aug. 5	do	do	
Aug. 6	do	do	
Aug. 7	do	do	
Aug. 8	General Grant Park	Leave Oakland	
Aug. 9	do	Salt Lake City	
Aug. 10	Los Angeles	Royal Gorge	
Aug. 11	do	En route	
Aug. 12	do	Chicago	
Aug. 13	San Diego	Boston	
Aug. 14	do		
Aug. 15	Riverside		
Aug. 16	Redlands		
Aug. 17, 18	Grand Canyon		
Aug. 19, 20	En route		
Aug. 21	Chicago		
Aug. 22	Boston		

PRICES.

IV—52 days	$575
Chicago to Chicago	522
V—43 days	480
Chicago to Chicago	427
VI—30 days	365
Chicago to Chicago	312

SCHEDULE OF NATIONAL PARK TOURS ARRANGED BY THE MASSACHUSETTS FORESTRY ASSOCIATION.—Continued.

	VII.	VIII.	IX.
July 9	Leave Boston	Leave Boston	Leave Boston.
July 10	Leave Chicago	Leave Chicago	Leave Chicago.
July 11	En route	En route	En route.
July 12	Glacier Park	Glacier Park	Glacier Park.
July 13	do	do	Do.
July 14	do	do	Do
July 15	do	do	Do.
July 16	do	do	Do.
July 17	do	do	Do.
July 18	En route	En route	En route.
July 19	Lake Chelan	Lake Chelan	Lake Chelan.
July 20	Seattle	Seattle	Seattle.
July 21	do	do	Do.
July 22	Mount Rainier	Mount Rainier	Mount Rainier.
July 23	do	do	Do.
July 24	do	do	Do.
July 25	Portland	Portland	Portland.
July 26	do	do	Do.
July 27	do	do	Do.
July 28	Crater Lake	Crater Lake	En route.
July 29	do	do	Do.
July 30	do	do	Chicago.
July 31	San Francisco	San Francisco	En route.
Aug. 1	do	do	Boston.
Aug. 2	do	do	
Aug. 3	Yosemite	Yosemite	
Aug. 4	do	do	
Aug. 5	do	do	
Aug. 6	do	do	
Aug. 7	do	do	
Aug. 8	General Grant Park	Leave Oakland	
Aug. 9	do	Salt Lake City	
Aug. 10	Los Angeles	Royal Gorge	
Aug. 11	do	En route	
Aug. 12	do	Chicago	
Aug. 13	San Diego	Boston	
Aug. 14	do		
Aug. 15	Riverside		
Aug. 16	Redlands		
Aug. 17, 18	Grand Canyon		
Aug. 19, 20	En route		
Aug. 21	Chicago		
Aug. 22	Boston		

PRICES.

VII—44 days	$497
Chicago to Chicago	444
VIII—35 days	402
Chicago to Chicago	349
IX—23 days	287
Chicago to Chicago	234

The prices include (1) rail and Pullman tickets only from Boston to Chicago and return, (2) all expenses from Chicago, as follows: Back to Chicago for all tours reaching Chicago August 21. Through Portland, thence rail and Pullman only for all tours returning from Portland. Through the Yosemite, thence rail and Pullman only for all tours returning from the Yosemite. Stop-over privileges on any of these returns.

Tours leaving on July 3 and July 9 include rail and Pullman only to the Yellowstone and to Glacier Park, respectively; thence as under (2).

Where the price is inclusive, every calculable expense is covered, except laundry and similar personal items. Transportation to and from railroad stations is included, three meals per day, all fees and tips, all expenses in connection with excursions included in the itinerary.

Accommodations.—Standard Pullman sleepers (one-half section) included throughout. Hotels on a basis of two in a room, without bath, except in Seattle and San Francisco, where rooms with private baths are included. Rooms with private baths elsewhere and compartments or drawing rooms on sleepers will, if available, be provided upon request at the actual difference in cost.

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